AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 6, No. 35 WEEKLY. | NEW YORK, SEPTEMBER 1, 1883. | $3.00 per Annum. SINGLE COPIES, 6 CENTS.

COPYRIGHT, 1883, BY AMERICAN MACHINIST PUBLISHING COMPANY.

For Sale Everywhere by Newsdealers.

ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

Motive Power and Traction Machinery of the New York and Brooklyn Bridge.

The engravings which we are enabled to lay before our readers on pages 1, 2 and 3, represent the application of the system of wire-cable traction to the purpose of passenger traffic on the New York and Brooklyn bridge; a system first put into practical operation through the services of Mr. Eppelsheimer on a street railroad in the City of San Francisco, in the year 1872. For assistance in the preparation of the drawings from which the engravings were made, as well as for other valuable assistance in the matter, we are indebted to the courtesy of A. H. Mathesius, M. E., who, under the direction of Col. Paine, the engineer in charge, worked out the application of this system to service on the bridge, and superintended the construction and erection of the machinery. Mr. Mathesius has had an extended experience in wire-rope roads and in wire-rope transmission and propulsion under a variety of circumstances, and it is largely to his skill and experience that the conditions in this instance—conditions calling for different considerations from any heretofore involved—have been successfully met.

By this system an endless wire rope or cable is kept in constant motion at the maximum speed at which the cars are to be moved, traversing the length of the bridge in one direction on one of the two tracks and returning on the other track. To this cable the cars are attached at will by a gripping device, the kind used being that known as the roller grip. This device permits the cable in starting the car to slip, so that it is started slowly and the motion gradually increased up to the speed of the cable. This is an absolute requirement, as it would be impossible to start the car without it, and destructive to do so too quickly. The cable is of steel, 1½ inch in diameter and 2¼ miles in length, and is moved at a velocity of 10 miles per hour. It runs in the direction of New York on the upper or north track, and in the direction of Brooklyn on the lower or south track.

The motive power is located on the Brooklyn side, under the approach to the bridge, and consists of two horizontal non-condensing automatic cut-off engines, designed by E D. Leavitt, Jr., and built by the Dickson Manufacturing Co. The cylinders of these engines are each 26 inches in diameter, with a stroke of four feet. The main valves are flat-ported slides driven by eccentrics. Upon the back of these are ported cut-off valves, which receive a compound motion from the cross-heads of the main slides and from cams situated on horizontal shafts driven by gearing from the crank shaft. These cams are subject to adjustment by the governor, which is of the Porter type, by means of which the point of cut-off is automatically determined. The engines are coupled at right angles, and run at a speed of about 60 revolutions per minute. Steam is furnished by two batteries of Babcock & Wilcox boilers, of the water-tube type. The arrangement by which the engines are coupled together is such that either may be run independently of the other, or both may be run together, the coupling and uncoupling being accomplished by shifting a clutch. This is because at such times during the day as the travel is light one engine is sufficient for the work, and will do it with much better economy than both, while at other times both will be required; also, if one engine is disabled it will not be necessary to entirely stop the running of cars. A general plan of the more important driving mechanism is shown in Fig. 1; also an elevation of the main winding drums, the friction drum, driving gears and bed-plate of these parts. The engines are set in a direction across, or at right angles to the direction of the bridge. In Fig. 1, *A* and *B* are the two main winding drums, each 12 feet in diameter, scored or grooved for the cable. Around these drums the cable is passed a sufficient number of times to secure the necessary friction, and these drums receiving motion from the engine move the cable along in its circuit.

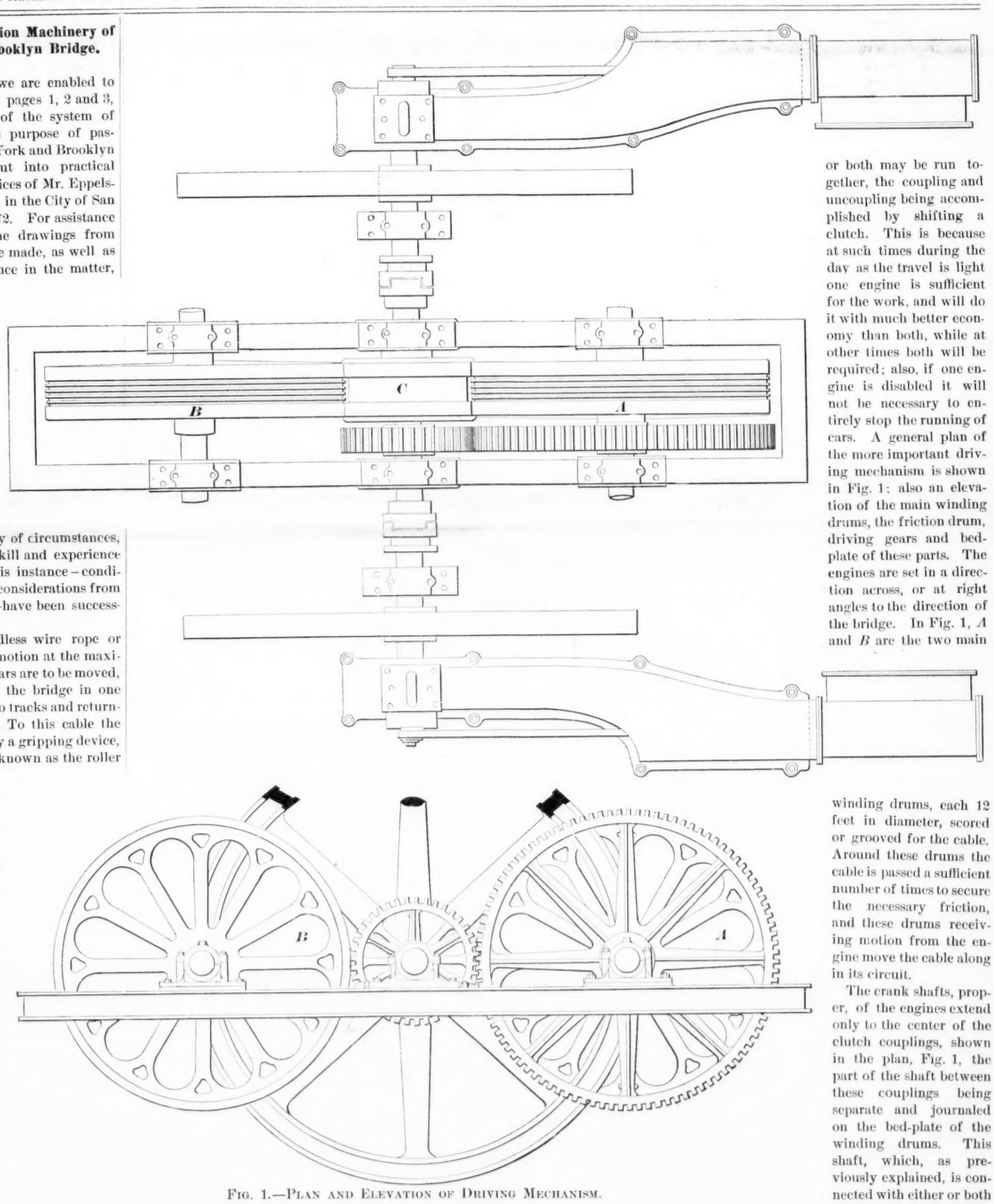


FIG. 1.—PLAN AND ELEVATION OF DRIVING MECHANISM.

The crank shafts, proper, of the engines extend only to the center of the clutch couplings, shown in the plan, Fig. 1, the part of the shaft between these couplings being separate and journaled on the bed-plate of the winding drums. This shaft, which, as previously explained, is connected with either or both engines by the clutch couplings, carries the friction drum *C*, and a pinion, which drives the winding drums through a gear on one of the drum shafts. The friction drum is five feet in diameter, and the pitch diameter of the driving pinion is the same, with a pitch of nearly five inches, and a twelve-inch face. The diame-

ter of the gear on the shaft with the drum *A*, is twelve feet, or the same as that of the drum. The teeth of both the driving pinion and the gear are machine cut.

The cable passing around the two large drums exerts a strong pressure to pull them in a direction towards each other, which but for the friction drum *C*, would be resisted by the journals of their shafts. To avoid this the arrangement of the friction drum with relation to the main drums is such that the plain parts of the faces of the latter (the parts of the faces outside the grooved parts) are in contact with the corresponding plain surfaces of the face of the former. By this arrangement the strain tending to pull the main drums towards each other is met by the friction drum, the friction converted into that of rolling, and the journals relieved of all stress from this cause. Further than this the friction between the drums assists the gears to drive the main drums; the frictional surfaces of the winding drums and of the friction drum being the same, respectively, as the diameter of the gear and pinion permits the pinion and drum to drive in unison.

To trace the connection of the cable: commencing with drum *A*, it passes three and one-half times around drums *A* and *B*, (similar to a belt connecting two pulleys) that number of times providing for sufficient friction to prevent slipping. Since in passing from one drum to the other—forward and back—the cable must advance in the direction of the axes of the drums a distance equal to the pitch of the grooves, it would unless prevented, be drawn against the edges of the grooves, destroying them as well as the cable. To avoid this, the axes of the drum shafts are not arranged in exactly the same horizontal plane, a journal of one shaft being raised on one side of the bed plate and a journal of the other shaft similarly raised on the other side of the bed-plate. The amount of this elevation is just sufficient to lead the cable from one drum to the other in a line at right angles to the axes of the shafts, so that it enters the grooves fairly instead of across the corners of the metal between them, the advance of the cable in the direction of the axes of the shafts being made on the drums.

From drum *B*, the continuation of the cable may be traced by the direction of the arrows on Fig. 2, which represents an end elevation of the drum *B*, a side elevation of the guide sheaves *D* and *E*, and the balance car *F*, upon which is located the guide sheave *G*. These three last named are ordinary sheaves ten feet in diameter, with deep single grooves. The cable, after leaving drum *B*, passes as represented over the sheave *D*, to and around the sheave *G*, (on the balance car) from there to sheave *E*, and up to the road surface, where by means of another large guide sheave it is led to the track

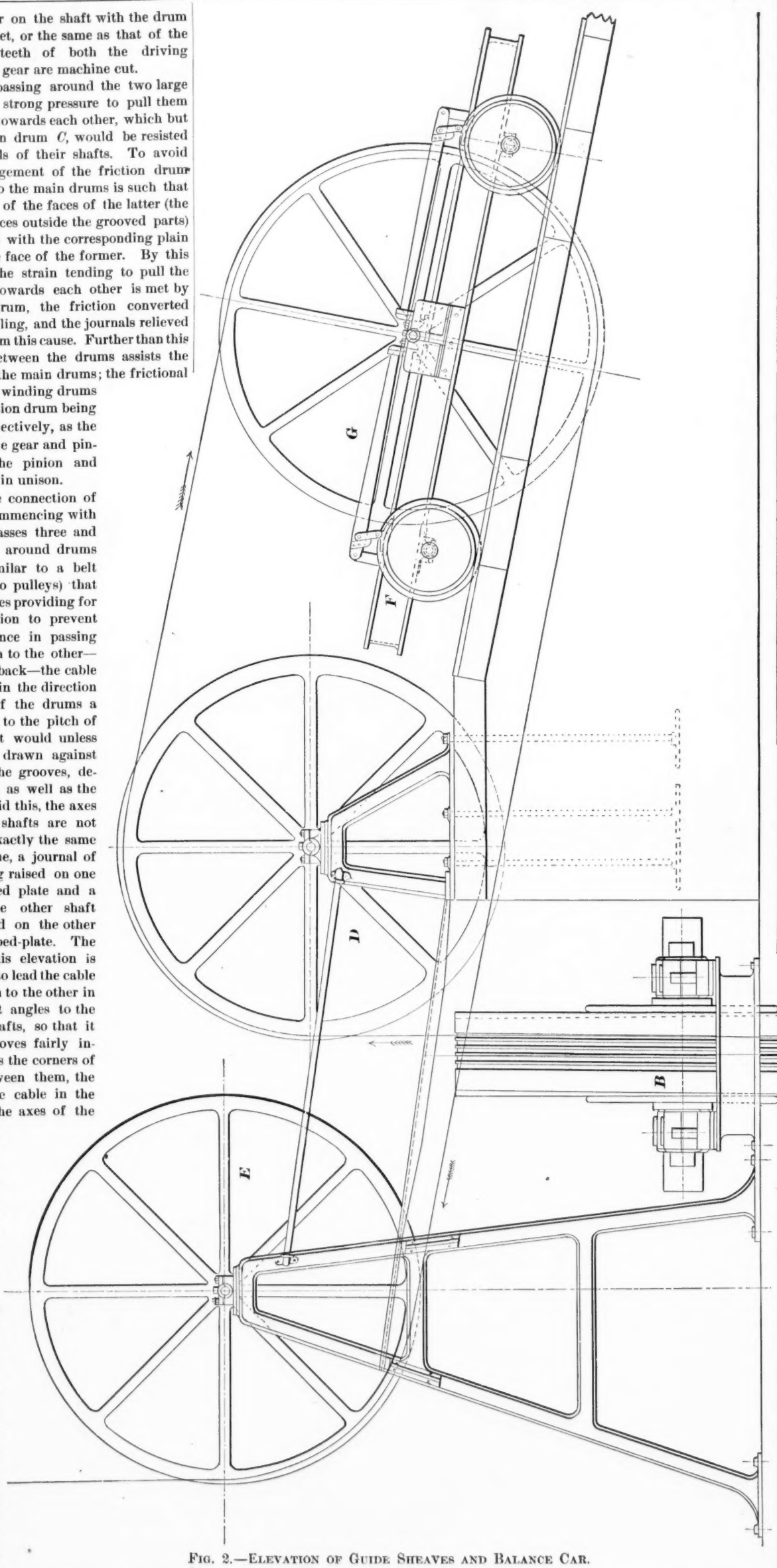


FIG. 2.—ELEVATION OF GUIDE SHEAVES AND BALANCE CAR.

Along the center of the track it is supported and guided on small carrying sheaves 15″ in diameter, mounted in cases placed at intervals of about 30 feet. Reaching the New York side the cable leads to the pulleys shown in plan and elevation in Fig. 3. Here it passes over the first of these pulleys and under the second, the object of which will be explained further on.

The bed-plate of these pulleys instead of being level is set at a considerable inclination, so that the first pulley may occupy the proper position, vertically, to receive the cable from the carrier sheaves on the track, and at the same time the second pulley be at the proper distance below the track.

It is now necessary that the cable cross over the end of the bridge, to return on the other track. For this purpose it passes from the second of the two pulleys referred to to a large guide sheave, horizontally located on a pin projecting upwards from a heavy "spider" casting, firmly anchored. Around this sheave, which it will be understood is below the passageways of the bridge, the cable makes a quarter turn, passes across the end of the bridge and makes a second quarter turn around a horizontal sheave on a second balance car. From this it passes along and at an angle upwards, and is led over a guide sheave to the small carrier sheaves on the lower track, and across to the Brooklyn side, where it turns over a guide sheave and passes down to sheave *A* (Fig. 1), completing the circuit.

The purpose of the balance-car on the Brooklyn side (*F* in Fig. 2) is in a degree to equalize the strain on and to provide for taking up the permanent and fluctuating slack of the cable. The need of this may be readily seen when it is considered that however accurately, as to length, the cable may have been spliced, the length will be subject to constant change from the effect of contraction and expansion, that the deflection will be different under the varying conditions of loads (the effect of which will be substantially the same as a change in length) and that a positive change in length from stretching will occur. This balance-car is a four-wheeled truck, mounted on an inclined track 90 feet in length and weighted to the extent found necessary.

The part of the cable taken up in passing to and from and around the sheave on the balance-car may be considered as a loop, which the balance-car by its gravity on the inclined track constantly tends to lengthen, and which it does permanently lengthen as the length of the cable is permanently increased. The deflection of the cable, however, being subject to continual change, the balance-car only partially equalizing this deflection, there will be a motion of the car both up and down the inclined track. This motion is not violent when the car moves down the track; in other words, when the loop is lengthened, but when the strain on the cable is such as to move the car up the incline—shortening the loop—it was thought advisable to provide against its moving too far and too violently. This is done by means of automatic brakes on the wheels, which are shown in the engraving, and which may be described as follows: A brake-shoe is attached to a lever near its fulcrum by means of a short jointed link. To the outer end of this lever a weight of sufficient gravity is attached, and so arranged that when the connecting link is considerably out of a vertical position the weight will rest on a shelf immediately underneath it, the brake then being inoperative. As the link assumes a position more nearly vertical the weight is raised from the shelf and the brake applied to an extent corresponding to the weight and its leverage. When the motion of the car is in the direction down the incline the friction of the wheel against the shoe carries the link away from a vertical position until the weight rests on the shelf. When the motion of the car is in the direction up the incline the friction brings the link towards a vertical position and the weight is raised. A stop prevents the link being carried beyond a vertical position in the wrong direction. From this it may be seen that when the car commences to ascend the incline the brakes are applied, which has substantially the same effect as increasing the weight, and that when it commences to move in the opposite direction the brakes are released.

In the engraving the brakes are shown as applied to the wheels.

The balance car on the New York side serving only to partially equalize the strain on the cable and not to regulate the length, is much lighter than the one on the Brooklyn side, is not provided with brakes and can only move for a short distance on an inclined track. The strain of the cable, however, being in a direction at an angle with the direction of the track (the cable making a quarter turn around the horizontal sheave) has a tendency to pull the car off the track at the side. This is prevented by mounting upon the same vertical shaft upon which the sheave is mounted a roller or wheel of large diameter, the flat face of which rolling against a permanent guide takes the pull of the cable.

Referring to Fig. 3, it will be understood that the cable passing under tension over and under the two pulleys will cause them to revolve with their respective shafts, to which they are made fast. On each shaft are drums scored for ¾ inch wire cable. These drums are normally loose on their shafts, but may be clutched to revolve with them by means of powerful friction clutches, operated by the levers shown. The shafts have motion in opposite directions, and cables passed three or four times about the drums and led off over suitable guide sheaves to the track are used for switching the cars on the New York side. On the Brooklyn side small locomotives are used for switching.

Provision is made for oiling the loose drums by drilling holes in the ends of the shafts to a little beyond the drum bearings. The outer portions of these holes are threaded and by means of pipe and elbows oil cups are attached. These oil cups revolve with the shaft, but friction collars in the connections permit them to be held stationary for examination and for filling. The grooves of the pulleys referred to are filled with wood, a section of the rim of one being shown on a larger scale in Fig. 4.

There are no special peculiarities about the small carrier sheaves and cases along the tracks, except in the arrangement for oiling the journals of the shafts. As the location of these sheaves is such that they cannot be come at conveniently when cars are running, it is quite important that they shall run for a considerable time without attention. The manner of providing for this may be seen in Figs. 5 and 6, which are, respectively, a full size elevation and a longitudinal section of one of the boxes of a sheave case. The shaft has a circumferential groove cut in each journal near the inner end of the bearing. This in babbitting the box leaves a corresponding ring *a*, of babbitt metal. At the outer end the box is solid or closed, making an oil reservoir *b*. This reservoir can be filled with oil to the top of the ring *a*, before it will run out. A channel *c*, provides for the distribution of oil under the journal. As there is no upward pressure the cap is simply a shell hinged to the box and made to close tightly to exclude dust and dirt, and at the same time be conveniently opened for filling the oil reservoir. The reservoir holds oil sufficient to last for several weeks, and being filled at regular intervals should avoid trouble from this source.

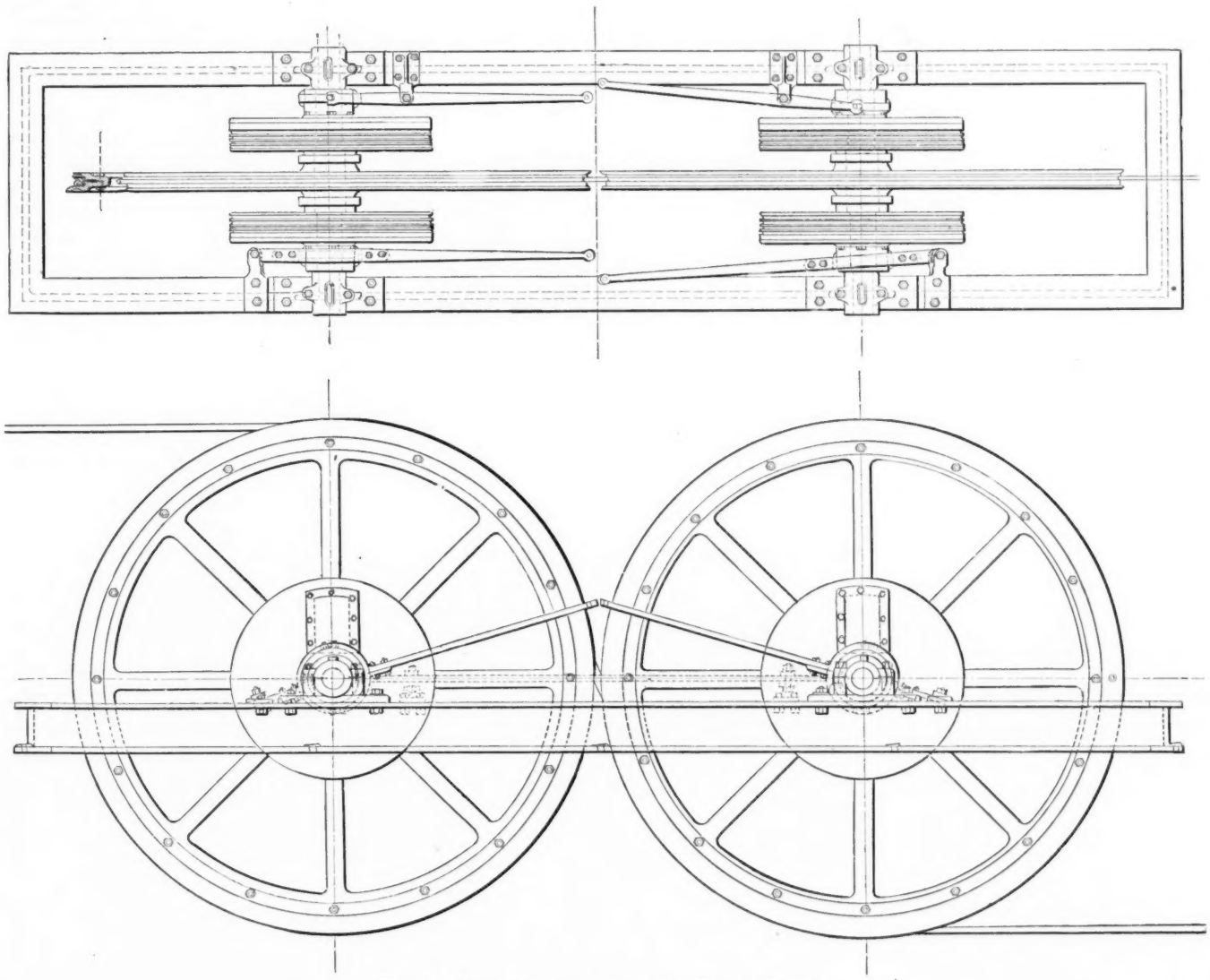


FIG. 3.—SHEAVES AND AUXILIARY CABLE DRUMS.

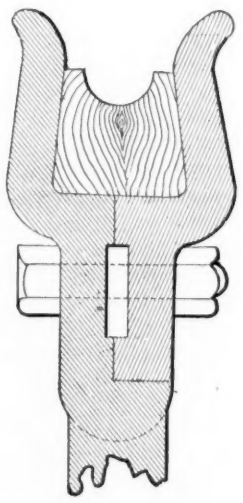


FIG. 4.

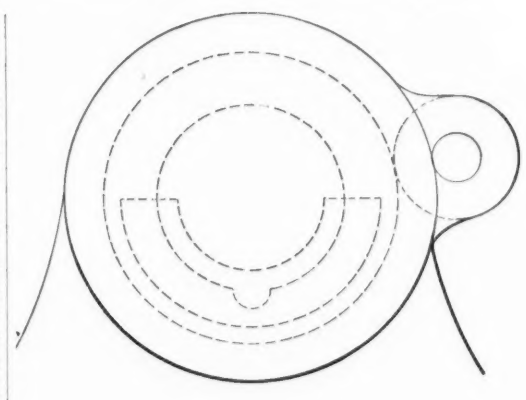


FIG. 5.

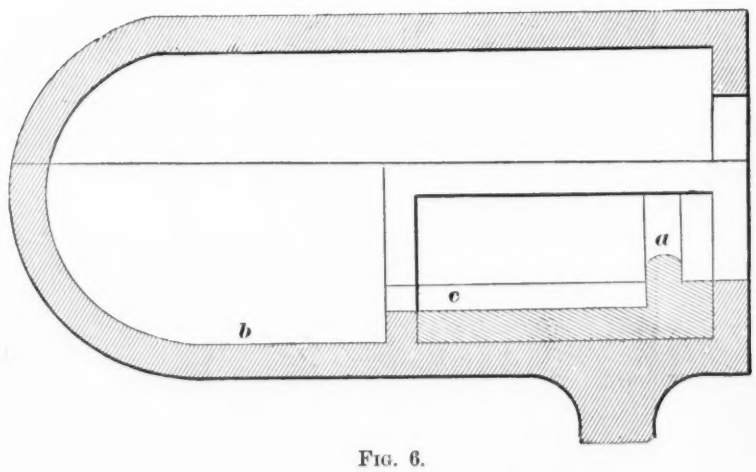


FIG. 6.

Metallization of Wood.

Les Mondes, a French journal, gives the particulars of a new process by which wood can be changed so as to resemble and possess several of the leading properties of metal The wood is first placed in a bath of caustic alkali at a temperature from 167 to 194 Fahr. where it remains two or three hours, the time depending upon the porosity of the wood. It is next treated to a bath of hydrosulphate of calcium, where it remains for twenty-four hours, when a concentrated solution of sulphur is added. After remaining in this mixture twenty-eight hours the wood is changed into a bath of acetate of lead, which is kept at a temperature of about 100 Fahr. Here it remains for fifty hours, when the process is complete. When the wood subjected to this ordeal is dried, it is susceptible of a high degree of polish, giving the appearance of a metallic mirror. It remains unaffected by moisture, and beyond the usual influences which induce wood to decay.

The steamship Lampasas, a new addition to Mallory & Co.'s line, is a very handsomely-finished boat, the saloon being particularly attractive. The tonnage of the vessel is about three thousand. The engines are compound, the high-pressure cylinder being 40 inches diameter and the low-pressure cylinder 78 inches diameter, with a stroke for both pistons of 54 inches. The cranks are set at right angles and are counterbalanced. Steam exhausts from the high-pressure cylinder into the casing, which is steam jacketed. The engines would have been considered a highly creditable job on the Clyde fifteen years ago. There is nothing characteristically American about them, John Roach & Son having evidently copied the English patterns in their native simplicity and with minute details. The boilers reflect the talent of our native inventors. There are four of the latter of the cylindrical return flue type, each being fired by four furnaces. Steel one inch thick has been used in their construction and they are tested for 100 lbs. pressure.

A new compound locomotive in course of construction at Crewe, has two high-pressure cylinders 13″ diameter and one low-pressure cylinder 26″ diameter. The general construction of the engine is the same as the Webb compound locomotive, which has been running on the London and Northwestern Railway for the last year, the leading difference being that this is a heavier engine. In one respect this engine differs from anything previously produced. The valves of the high-pressure cylinders are placed beneath the cylinders, quite the reverse of the American plan. It is expected that this arrangement will save friction when the engine is running without steam, by keeping the valve face away from the seat.

During the opening demonstration at the Wilson Sewing Machine Works, at Wallingford, Ct , Governor Waller very truthfully said: "The happiness of the people should be the anxiety of the State, and as this happiness depends so much upon the character of their employment, the State should recognize, encourage, and foster every enterprise that offers to its industrial citizens an opportunity to support themselves in comfort, and to secure to their children by better education and better associations a fairer chance than they had at the beginning of life."

The National Association of Stationary Engineers will hold its second annual convention in Chicago, in Association Hall, Tuesday, October 2, at 10 A. M. Chicago Associations, Nos. 1 and 2, have made arrangements to have the delegates visit them on Tuesday evening. Wednesday evening they will be "shown the city by gaslight," and Thursday evening a ball will be tendered them by the Chicago Association. Friday afternoon they will be shown all points of interest in the city, in carriages furnished by the Chicago Associations, who are disposed to make the visit of their associates in every way pleasant.

Macdonald's Hydrostatic Leveling Instrument.

Machinists and millwrights are familiar with the difficulty in leveling various parts of machinery with the spirit level, targets, straight edges, &c., particularly line shafting which often passes through cramped places and carries numerous pulleys and other obstructions to the process of leveling.

The illustrations on this page represent a device made by Jas. Macdonald, of New York, in which the principle of water finding its level is utilized for the purpose, and which is said to reduce the labor to a minimum.

The instrument is represented in section by Fig. 1 and the outside by Fig. 2.

It consists essentially of two of these standards connected together by a flexible tube, rubber being used, which may be of any desired length, but which is usually 12 feet.

In Fig. 1 *D* is a glass tube graduated in thirty seconds of an inch, as shown in Fig. 2, and held in position by water-tight joints, *J*, *J*, between the conical valves, *E*, *E*. *C* is a brass tube connecting the valves, *E*, *E*, and slotted vertically on opposite sides so as to expose the graduations on *D*. This is attached permanently to the upper valve, but may be separated from the lower valve to give access to the glass tube *D*, by removing the taper pin *I*. *A* is also a brass tube slotted vertically corresponding with *C* and secured to the base *B*.

The upper conical valve *E* is ground in the top of *A*, while the lower valve is fitted to the base *B*.

The functions of these valves are, when closed, to confine the water in the instrument by closing the vent *G* in the upper valve, which communicates with the atmosphere and at the same time to cut off communication between the standards and the hose *M* through the arm *L*. By this means the air that remains in the standards above the surfaces of the water will be prevented from entering the rubber tube *M* when it is coiled up for being placed in a case. Otherwise the air would become mechanically mixed with the water and prevent the surfaces from indicating "the level" when next used. These valves are operated from the milled edge of the cap *H*, and are properly limited in their movement by the stop-pin *N* in the base, which extends into a slot cut in the outer circumference of the lower valve.

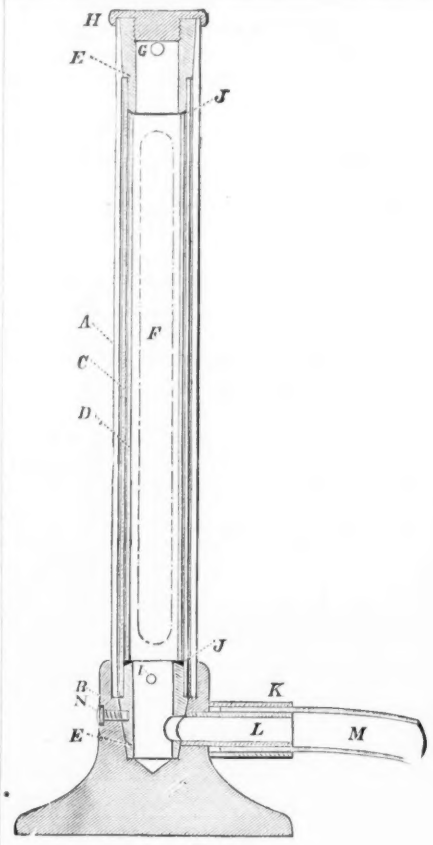


FIG. 1

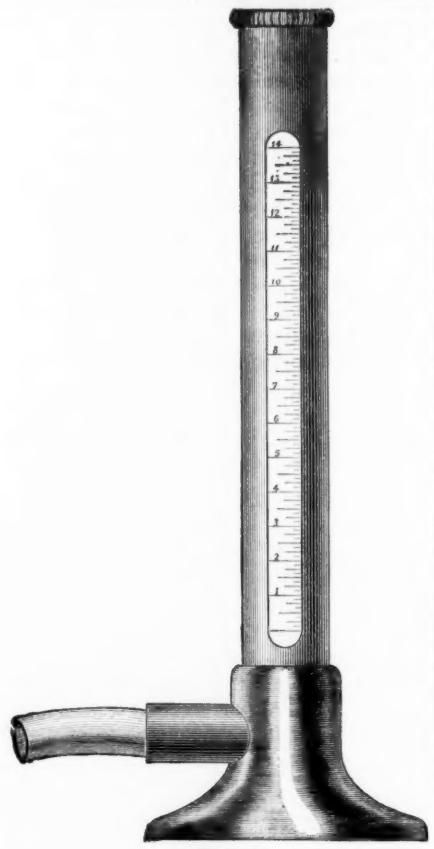


FIG. 2.

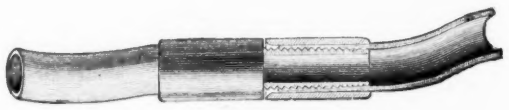


FIG. 3.

It will be seen that by the operation of closing these valves, the graduations and vertical slots in *C* are carried under the metal of the outer tube *A*, and thus the glass will be more effectually protected. Extra lengths of rubber tubing may be inserted between the standards by means of coupling shown in Fig. 3, which is merely a short nipple over which the ends of the tubing are stretched and held by two ferrules on the outside.

The level is charged with water till it appears in each of the graduated gauges, and when the altitude of two points relative to a horizontal line is to be determined, a standard is placed on each.

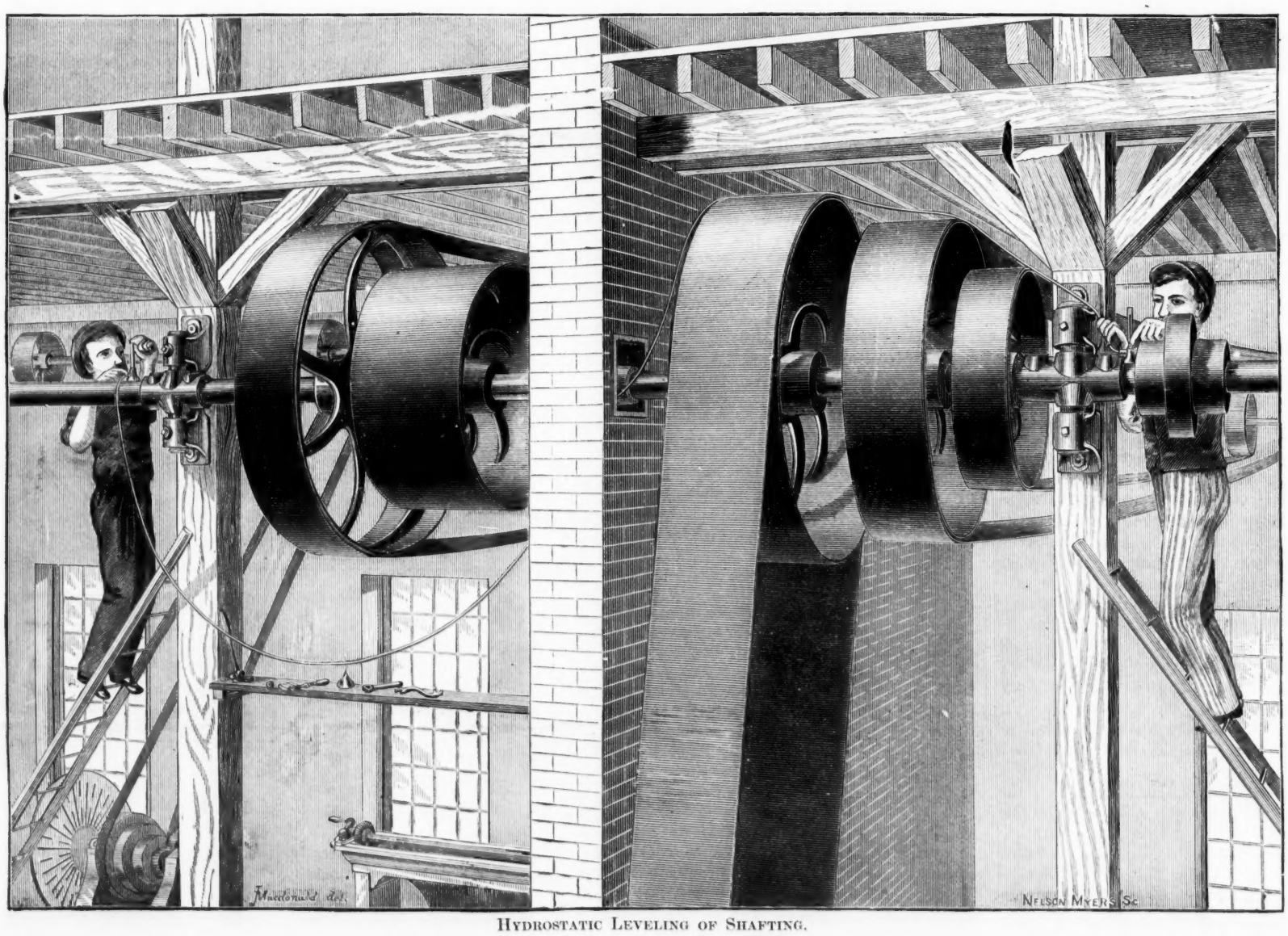
The valves, *E*, *E*, are opened by placing the thumb and finger on the milled edge of the cap *H* and turning to the left. This will admit the atmosphere through the vent *G* and establish communication between the standards and the hose *M*. The water will then immediately assume "the level" in the glass gauges, and the difference between the points indicated by the surfaces of the water on the graduations will be the difference in altitude between the two points on which the standards rest.

Thus, if the water in one gauge rose to 6 and in the other indicated 10, the difference in height between the points would be 4 quarters or 1″.

The most important feature in this level is that the points to be leveled may be separated by any amount of obstructions and by any reasonable distance, and the operation may be conveniently performed so long as the flexible tube can be passed around or through the obstructions from one point to the other, and as the bases are only 2″ in diameter they may be used in cramped places—a condition that often exists especially in line shafting. The cut below shows it thus applied.

The device is handsomely nickel-plated and provided with a suitable box for keeping it in when not in use.

Mr. Fred. A. Hodgson, No. 294 Broadway, N. Y., is the agent for the United States and Canada.



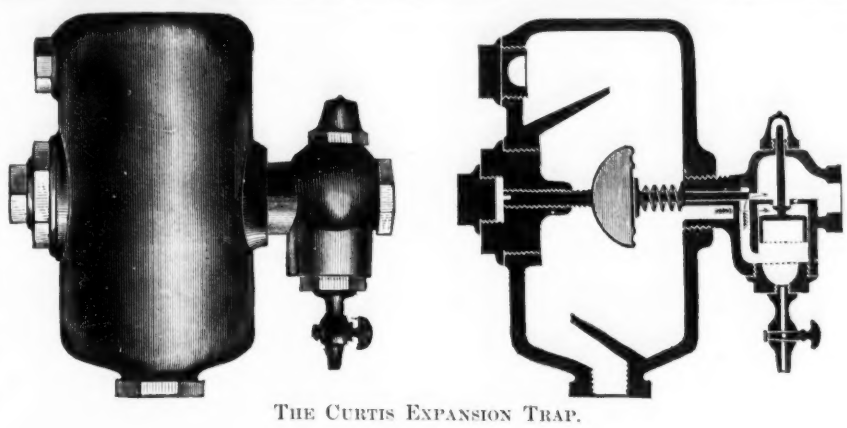
HYDROSTATIC LEVELING OF SHAFTING.

On the main line of the Philadelphia and Reading Railroad there are fifty-seven locomotives employed on coal-hauling traffic alone. Of these, forty-six have Wootten fire-boxes and eleven retain the old oblong fire-box. On the expenses sheet for June the engines with the Wootten fire-box cost 4.1 cents. per mile for stores and coal, while the locomotives with the old style of fire-box were operated at an expense of 12.6 cents a mile for stores and coal. The Wootten fire-boxes consumed anthracite slack, and the ordinary fire-box common anthracite coal.

The Curtis Expansion Trap.

The accompanying engravings represent in elevation and section the new expansion steam trap, manufactured by the Curtis Regulator Company, 51 Beverly St., Boston, Mass. An object sought in the design of this trap is to provide for the discharge of the condensed water under all circumstances at a temperature below 212°, thus saving the large amount of heat well known to be latent in water above that temperature.

The construction and operation of this trap may be understood from the engravings and the following description:



THE CURTIS EXPANSION TRAP.

The sectional view shows a main valve lifted by a very loose-fitting piston, a passage connecting the top of the piston with the outlet; a very small valve controlling that passage (by means of an expansion vessel and a stiff spring) and a mud drum, which can be cleaned by taking off the lower cap. The principle upon which the trap works is the change of pressure on the top of the piston, the pressure underneath remaining constant (being the same as the pressure in the trap) Suppose the trap to be cold, the flexible surface of the expansion vessel is pushed back by the stiff spring, thus opening the valve. The opening of this valve connects the top of piston with the outlet (under the seat of the main valve) and, relieving the pressure on top of the piston, permits the pressure underneath to raise the outlet valve for a free discharge. Steam being let on, all the air and water in the pipes flows out freely until the temperature of the water reaches the point at which the trap is set to close. At this point the expansion in the vessel is sufficient to force the secondary valve toward its seat. This restrains the flow of water through the connecting passage, thereby increasing the pressure on the top of the piston, which pressure forces the outlet valve toward its seat and diminishes the flow of water, delivering it only at the temperature at which the trap is set to deliver. The small cap at the back can be off while pressure is on, and the degree of temperature raised by turning back with a screw-driver and lowered by turning forward.

The following advantages are claimed by the manufacturers for this trap:

It will fully control the outlet valve on a change of temperature of 5°.

The outlet valve has an area nearly equal to the area of the connecting pipes, and is on the outside of the trap.

It will discharge air as freely as water, and remove large quantities of air as fast as the steam will displace it.

It has no glands, friction or packing. Any trap will work under from one to one hundred lbs. pressure.

It has a mud-drum to catch sediment and an opening to remove it, and it is small, simple, durable and accessible.

The capability of discharging air is a most important feature of a steam trap, as air, unlike steam, can part with its heat without reducing its bulk.

Cold air opens the expansion-trap as certainly as cold water, and, as when steam is let on to the pipes it drives the air before it, this air being cold is all expelled before steam can reach the trap to close it.

Extended Smoke-Box.

The extended smoke-box for locomotives, which admits of the sparks being retained when they reach that point, seems to be gaining in favor. It was well spoken of at the last Master Mechanics' Convention by those who had had any experience using it. The extended smoke-box is probably susceptible of further improvements in the way of making it a perfect spark arrester, but the inventive talent of the country may succeed in making it all that can be desired.

Two inventions have just been patented by Henry Milholland, of Philadelphia, relating to the extended smoke-box. One of the devices aims to concentrate the blast in the base of the smoke-stack, with a view of equalizing the draught through the flues, a point which exercises important effects upon the economical working of an engine. The other is an arrangement of a deflecting plate, whose object is to deposit and retain the sparks in the front part of the smoke-box. James K. Taylor, of Boston, also has directed his inventive faculties upon the extended smoke-box, which results in a patent for ventilating the cinders compartment.

File-Truing Device.

Every worker in metals appreciates the difficulty of filing small pieces absolutely flat, and it would probably be difficult to find a machinist accustomed to light work who had not at different times resorted to the expedient of holding such pieces between the thumb and finger and rubbing them on a file, in the attempt to produce true surfaces. The difficulty in the way of producing true surfaces by this means is in the fact that the surface of the file, however carefully made, is anything but a true surface, and hence will not produce a true surface on the piece operated upon.

FILE-TRUING DEVICE.

The engraving presented with this represents a device made by Kearney & Foot, 101 Chambers street, New York, the object of which is to provide an absolutely true-cut surface for the use of machinists, jewelers, and other metal workers, and for the purpose above referred to. The device consists of a cast-iron frame that may be set upon or bolted to the bench, and adapted to hold a block, the surfaces of which are cut similar to a file. The block is held between the two set screws, at the ends, and by the countersink bolt through the center, and by the use of the double row of set screws underneath may (by the use of a straight edge) be sprung so as to present a true surface for use, which can of course be trued up from time to time, if it should wear out of shape. Shoes under the set screws, between their ends and the block, prevent injuring the latter.

These frames are made for blocks of different lengths and widths, and the blocks, which are of any cut desired, from "bastard" to "super dead smooth," when worn can be re-cut as readily as a file.

The experience with the Webb compound locomotive has been considered so satisfactory on the London & Northwestern railway that several other British railway companies intend trying that type of engine. The Great Western railway of France and the Austrian State railways are also experimenting with compound locomotives.

The Milling Machine, Its Construction and Uses.

BY JOHN J. GRANT.

SECOND PAPER.

The milling machine having the most extended use in the plain or slab machine, and the style called the Lincoln pattern, will be found the best yet made. The credit of this design, I think, belongs to Mr. F. A. Pratt, of the Pratt & Whitney Company of Hartford, Conn.

In this style of machine the requirements of a good tool are more fully carried out than in any other I have seen.

The first of these is stiffness and freedom from jar or chattering. This is a very essential point in any machine, as any vibration between the cutter and the work will cause the cutter to become dull, and you never have the satisfaction of being able to do a first-class job.

The second is the ease and rapidity with which the platen or slide is operated. This is another point that will be found invaluable in a machine, as it enables more work to be turned off with a less amount of manual labor.

Third, the tail-block is bolted to the bed for the purpose of supporting the end of the cutter arbor, and is adjustable in height. This is another point that should be looked after in the purchase of any milling machine, as it enables the operator to adjust the cutter to mill to gauge in case the fixture does not stand perfectly parallel with the cutter arbor or the cutter itself is not ground to exact diameter at each end.

There are points of superiority in this style of machine that will be mentioned hereafter.

In my opinion all milling machines should be constructed so that the top of the slide, where the work is to be bedded, can be milled off in the same manner that the platen of a planer can be planed off, by the machine itself. The reason is obvious.

Next to the machine in importance is the fixture, as no matter how good or perfect the design or workmanship on both machines or cutters, it is of no avail if the fixture or vise be imperfect. It should be made with plenty of metal in the base, and should there be any slide or loose jaws they should be rigidly gibbed or screwed down, as it will be impossible to do accurate work without this precaution. It should also be securely bolted to the platen, as all joints in every iron-working tool are a detriment, and should be avoided whenever practicable. When they are necessary make them as near like a solid piece as possible.

Next comes the cutter arbors. In nearly every case if the tool-maker is left to make them to his own taste they will be found too small. The machine we are now speaking of is what is called No. 2, fifty of this size being in use to one of any other size or style. Arbors for all work where it is possible to use them should be at least 1″ diameter and 1⅛″ or even 1¼″ would be better. They should be made to standard gauge, and the hole in the cutter left small enough to grind or lap out to fit them. The collars should be as large as possible, and should always be squared up on both sides without reversing the mandrel they are turned on. This is of the most vital importance to perfect work. The shoulder on the arbor should be squared in the same way before removing the lathe-dog after turning the fit for the cutters. The end of the arbor should never be pointed like a lathe center, as the expansion caused by the heating of the cutters will, by pressing hard back against the dead center, cause it to spring and make bad work. The end should be left parallel for about 1″ in length, and should be about ¾″ diameter, or just below the thread of the binding nut. This end should be hardened and ground. The binding nut should be made with a fine thread, say about 12″ pitch, and where it comes against the face of the collars it should be accurately squared.

Finally, too much care cannot be taken to have everything perfect in the arbor, as the first cost is only a trifle more than in doing a poor job, while the satisfaction of knowing that your arbor is perfect more than compensates for the extra work.

In my next I will give a drawing of a 1′ arbor with collars and nuts as now generally used by all gun and sewing-machine factories.

For jobbing, with one set of collars made from ¼″ to 1″ in width, varying by sixteenths, another set from ¼″ to ½″, varying by thirty seconds and a few others say ⅛″, ¼″ and ⅛″, also washers of different thicknesses of paper, a combination of distances between cutters can be made that will accommodate any size work. It will astonish those who are not familiar with the milling machine to see how perfect to the gauge a piece can be milled by packing between the cutters with washers cut from tissue paper. The spindle of the tail-stock or outside support for the end of the arbor should have a hole bored in it to fit the parallel end of the arbor. This should be split and have a loose collar with set screw to clamp the tail spindle sufficient to take the jar off the cutter arbor, because this style of end bearing also allows the arbor to expand without throwing it out of adjustment. This also should be hardened and ground. The above arrangements are what are used in the best equipped shops of to-day. The writer expects to show drawings with some of the articles to follow of several new arrangements now being tested—that is, if the results are satisfactory.

The cutters are of such a variety of shapes and sizes that they require more than a passing notice, and several articles will be required to do them justice. But I will say here that the greatest of care must be used in their manufacture. Imperfection in them will be duplicated on the work, as they are simply a forming tool, and the more perfect to the desired shape the cutters are made, the less hand work will be required. Don't object to paying a fair price for the steel used in making cutters, as the labor on them costs from ten to fifty times the price of stock, and it is poor satisfaction to a good workman to do a first-class job on a tool, and then have a bad cutter from using poor steel. In a small shop where no regular tool maker is employed it will be found better to buy milling cutters. There are several concerns that make a specialty of milling cutters, some of which can be ground until the teeth are entirely cut away without altering the shape. This kind will be found very satisfactory in jobbing shops.

LETTERS FROM PRACTICAL MEN.

Twist Drill Grinding Machines—Proposed Form of Lip—The Twist Drill as a Substitute for the Rose Bit.

Editor American Machinist:

I have recently had the pleasure of seeing two different, thoroughly well studied, neatly designed and splendidly built machines for grinding twist drills. They do not operate on the same principle, nor produce the same results, neither are they the only machines that have been built for the same purpose.

The earliest machine brought to my notice with which it was proposed to grind twist drills on scientific principles, was the Van Haagen machine, built in '73 or '74. At the Centennial a machine of George Richards' design was shown in the exhibit of D. B. Whitney, for which the claim was made that it was nearer correct in its result, than the Van Haagen machine. For one of the two machines first mentioned, the Sellers, of which a cut was shown in a recent issue of the AMERICAN MACHINIST, it is claimed produces the correct form, but whether the result is like either that produced by that of the Van Haagen or Richards machine, I do not know. It is decidedly different in its manner of working, and the device for holding the drill is unquestionably better.

The other new machine, built by the Pratt & Whitney Company, differs from all the others, not only in design and method of holding the drill, but also in the shape of the point and cutting edge given the drill. I do not know whether it is claimed that the point and edge are theoretically correct, but according to my notion the best form is approached.

Let it be understood that I intend to say nothing except in praise of both the Sellers and Pratt & Whitney machines, believing that both produce exactly what their designers intended they should produce, and too, what each believed to be the best possible form for the work to be done.

If the cutting edges of a straight lip twist drill run in radial lines completely to the center of the drill, then the case would be simple, but being neither radial nor running to the center complicates the case. In drills of different sizes, and often in drills of the same size, and in different parts of the same drill, the conditions vary, so that there must be some sort of a compromise. Any method of grinding that produces a curved surface on each lip produces something approaching a cone at the point, and as a true cone would not work at all, as it would act as a center and not cut its way into the metal, so the form most nearly approaching the cone must be worse for that part of the drill, and in that respect the Pratt & Whitney method leaves a bevel along the cutting edge of each lip, and by that means leaves the point more nearly wedge-shape than the method of grinding a full curved surface.

My own idea is that, so far as the cutting edge of the lip is concerned, if the grinding starts from the edge with a proper degree of clearance, it makes no difference whether the following surface is straight, concave, or convex, provided the straight or convex surface does not leave a point to drag in the hole.

Let the Figures 1, 2, and 3 represent the developed surface of one lip of a twist drill. Fig. 1 fairly represents the drill as sent out by the makers, and as left by the scientific grinding machine; Fig. 2 a shape they sometimes get into when ground by hand, and Fig. 3 the form they would assume if ground a straight bevel, and which shows that the back corner would prevent the drill from cutting. So far as the cutting edge is concerned, I believe all would cut equally well, but in the ones shown in Figs. 1 and 2 the points will be conical, and the one in Fig. 3 wedge-shape.

Any firm using twist drills exclusively finds, I think, that it involves quite an item of expense, and that the cost is as much attributable to breakage as to actual wear. A large proportion of the breakage expense comes from the drill commencing to break at the bottom of a deep hole, and being shattered all the way up to the top. Why a twist drill breaks in this peculiar manner is easily shown when the direction of the fracture is observed.

When a drill, as ground by the makers, breaks by being forced too hard, the break invariably takes place as shown at *A*, Fig. 4. The piece broken off wedges fast, and unless the machine is instantly stopped a succession of breaks takes place, as shown at *B*, *C*, *D*, &c., because each piece broken off wedges fast. The result of such a break not only involves the cost of the drill, but also sometimes double that cost in the time spent by the operator, his foreman, and the committee of 47, in getting out the pieces of the broken drill.

I have repeatedly demonstrated that this defect in the twist drill can be completely avoided, without impairing the efficiency of the tool by grinding, as shown below. When this drill breaks, it takes the form shown by the line *E*, Fig. 5, and the piece does not wedge, leaving the drill free to rotate. I have also demonstrated by actual trial that it is impossible to get any one, young or old, skilled or unskilled, to so grind a drill, however many times he may be shown or made to acknowledge the superiority of the method. I shall probably continue to believe this to be the best way to grind a twist drill until I meet with some man who can get as much hole in the same piece of metal, with the same expenditure of power, time and drill, ground in some other way, as I can with one ground in this style.

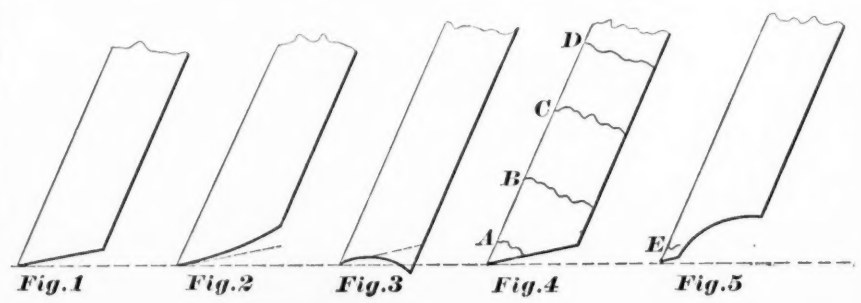
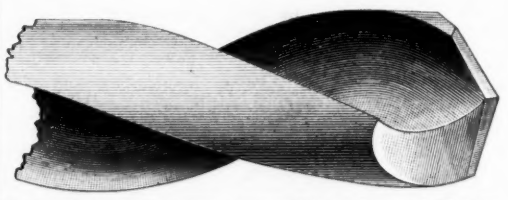


Fig. 1 *Fig. 2* *Fig. 3* *Fig. 4* *Fig. 5*



TWIST DRILL GROUND AFTER PROF. SWEET'S PLAN.

It is possible that if a twist-drill grinding machine was available for grinding in this shape, and it would seem that the problem would be simplified by adopting this form, then people might be induced to adopt it.

Twist drills, however ground, are a money-saving investment, though it is not infrequent to find mechanics raise powerful imaginary objections to them. One man says, "You can't ream out a hole that has been drilled too small with them." Another says, "You can't drill brass;" and another that "they won't do in sheet metal." All these things can be done as well with a twist drill as with any other. It is only a question of whether the man thinks more of his drill than he does of the job. Grind off the front edges of the drill so that the cutting edges are like the cutting edges of a flat drill, and the twist drill will do exactly what the flat drill will do.

Others say, "You can't drill holes to exact size with a twist drill." Don't try. Neither can you with a flat drill, nor can you ream a hole to exact size; nor two holes to the same size, with a reamer with any great certainty, unless it be a taper reamer; so that whether you can drill two holes of a size with a twist drill simply means: Can you get them near enough for your purpose for less money than in any other way?

We have been quite successful in using twist drills as a substitute for rose bits in reaming long holes. The drills are left without relief, ground true, and about 1-1000 inch to the foot tapering, smallest at the back, and the cutting lips square or a little convex, instead of beveled off, as is usual with rose bits. They persist in going pretty straight, regardless of the center hole.

In drilling holes for tapping in studs, a pretty common way is to drill in a little ways with the full-size drill, and then start in the tapping drill. To insure the small holes being true with the large one, an additional safeguard is reached by having the first drill more pointed than the second.

JOHN E. SWEET.

PROGRESSIVE IRON WORKS.

No. 30. **TIME CARD.** *Date, Aug. 1st, 1883.*

TO WHAT ACCOUNT CHARGED.	Pattern Maker.	Forge.	Boring Mill.	Pipe Machine.	Ream & Tapp.	No. 1 Planer.	No. 2 Planer.	No. 1 Lathe.	No. 2 Lathe.	Shaper.	Mill Machine.	Drill.	Vice.	Helper.
P. & N. Grinder Pan, ...			4											
Muller Plate, ...			6											

Signed by Workman, JOHN SMITH.

A Time-Card System.

Editor American Machinist:

The "time-card" system has been quite thoroughly ventilated through your columns, and we have anxiously looked for something which is superior to our present system, which has been made up from the ideas given by others, together with what few we could sandwich in of our own. "Chordal's" idea of what such a system should be is decidedly good, and we agree with him that when we expect the workman to write up his time we are expecting that for which not one in a hundred is qualified, and from our own experience we are satisfied that it is a most unsatisfactory way of keeping time. With a shop of forty or fifty men it is a heavy drain on the time of a foreman to give his orders in detail in writing, and many times we find the original order given by such foreman unsatisfactory from the loose way it is written. The workman understanding by verbal order what is to be done, writes the number of hours on the card written by the foreman, and when it comes to the office the foreman has to come and explain.

Our present system, we think, is as good as any we have yet seen, and we enclose the card. You will observe that if the foreman will simply write the name of the piece of work the workman has to handle, the time written under its proper heading tells the rest of the story. We find this method to have less defects than any other we have looked into as yet. R. G. E.

Endurance of Steel Plate Boilers.

Editor American Machinist:

Referring to your note of Aug. 18th, upon the use of steel in England for locomotive fire-boxes, let me say briefly that at least one of those who have had charge of locomotive work there, recognized years ago that the plates had been used of a thickness altogether too great to insure any sort of durability. This one was Mr. Rambsbottom, then locomotive superintendent of the London and Northwestern Railway. In a long talk with him in the summer of 1871, he told me that there was no doubt in his own mind that the experiments that had been made up to that time in England had failed almost solely for this reason. The practice in later years on his own road although under other management, ought to relieve the Society of Engineers to which you refer, from any uncertainty as to the endurance of steel plates when made of the right thickness. P. BARNES.

Elgin, Ill.

Hardening Steel with Cyanide.

Editor American Machinist:

I noticed in the AMERICAN MACHINIST of the 18th inst. a letter by Mr. Simonds in regard to "Hardening Steel" by the use of cyanide of potassium. About a year ago I had some experience in its use. I was then engaged on some work in which we had a great deal of extremely hard cast iron to work, both to plane and turn, as well as to drill, and I used the cyanide to harden all the tools—in fact, I was unable to make them stand without it. I found it to act just as Mr. S. describes as regards the depth of hardening. When used in small quantities, but going on the principle "if a little is good more will be better," I literally roasted the tools in it, usually keeping them at a low red for ten minutes, and applying the cyanide four or five times, the last time putting on a slightly increased blast so as to melt the cyanide rapidly and get an even coating of it, as it appeared to burn off, "or soak in," as some said, if heated slowly; then quench it as soon as it has a bright varnished appearance.

The piece would come out with a silvery-white look, and I did not draw the hardening at all.

I have hardened a twist drill of large size in this way, and use proved it to be much harder, but fully as tough and reliable as a good temper in the ordinary way.

In an extreme case, if a thread tool, I applied the cyanide nine times, and by hardening the tool over three times I did the job; but simply to test the value of the cyanide, I tried a tool of good ordinary temper, and failed to get it to cut more than about four inches, when it was about as blunt as the end of your thumb. It was not uncommon to have a tool that would cut a piece 18″ in length. It also served us equally well for reamers and countersinks. We never had a single piece crack by its use.

Bennington, Vt. CHAS. S. BEACH.

Hardening Steel with Cyanide of Potassium.

Editor American Machinist:

Your issue of Aug. 18th finds me, or I find it, at St. Albans, Vt., and in it I find "Hardening Steel" from the pen of C. E. Simonds. It may not be necessary for me to jump up like a jack in a box whenever anything is said about steel, and my opinions may not be of much value to your readers, but there are some thoughts suggested by the letter referred to which I will endeavor to put in readable shape, if this atmosphere so almost entirely devoid of the dust and smoke, and whirr and buzz, and roar and clang of mechanical and manufacturing operations to which I have been so accustomed does not prevent. And still there must be manufacturing and mechanical interests here, or why should my AMERICAN MACHINIST have been taken, as it was, from quite a bundle at the news-stand?

About case hardening steel: Experience teaches that steel which will not harden by simply heating and suddenly cooling may be superficially hardened by the use of either

cyanide of potassium, or prussiate of potash, or other agents which will carbonize the surface, but such hardening is truly "case hardening." Experience teaches again that steel which will harden extremely hard in the ordinary way sometimes has upon its surface a skin which fails to harden, so that in trying with a file, unless much care is exercised, the piece, which is really very hard, will be condemned as soft. In such cases the use of cyanide is very valuable as it operates to harden this thin skin of really decarbonized steel, or iron, on the surface, while beneath that the thing needed was simply to heat and cool suddenly.

Judgment should teach and experience will show that any piece of good cast steel, which will harden without "case hardening," will be hardened just as deep when the case hardening agent is used as it would be if hardened at the same heat without it, and that the use of cyanide of potassium in any case where anything more than a superficial hardening is needed will not permit a lower heat than would be required without it. To suppose that a piece of steel treated with cyanide at a lower heat than would harden it without the cyanide will be properly hardened, or that because "it can't be touched with a file" it is hard, is to be cheated.

Judgment should teach and experience will show that steel may be cracked in hardening by heating too hot, and also by uneven heating. The cyanide and low heating could hardly be blamed. The particular lot of "Hobson's choice" may have been to blame. I have usually found it pretty good steel, but am just enough of an American to believe as good—to say the least—can be had of home manufacture. First-class tool steel will harden to some considerable depth in water or brine without cyanide, and will not probably harden any deeper with it at the same heat, but just as deep. Good steel may be hardened equally well, in my judgment, with or without it, unless there is the surface spoken of which has been decarbonized.

The color is no indication of temper, except when the character and condition of the steel is known before drawing. Neither is the "file test" infallible, for a piece of steel may be case hardened and still not be sufficiently deep to be of service, although no file will mark it, while there may be cases in which the hardening is admirable but for a film on the surface, which may be easily filed. I have often amused myself by first carefully measuring a piece of hardened steel having this unhardened envelope of decarbonized steel, and then removing all that could be filed away, made a second measurement. I have found the hardened piece reduced in size, as much in some cases as .015", and as little in others as .0005". Still the piece of steel itself, with its skin off, was thoroughly hardened. Without saying that the use of cyanide would have made such pieces of steel all right, I am prepared to say that its use would have made them much better.

The greater difficulty experienced in hardening steel which has been repeatedly annealed grows out of the fact, probably, that the annealing is at too great a heat, or that the heat is too long continued. It is an easy matter to put the best piece of steel in the same condition by heating for hardening. Too much heat, or heat too long continued, will decarbonize the surface of steel, leading to the opinion that such steel does not harden because it can be filed. I like the hammer test better. If no bruises can be made with the well-hardened hammer on the surface of a piece of hardened steel, it is safe to suppose that it is both *hard* and hardened to a "*proper depth*."

One more point: Mr. Simonds quotes me as saying, "A tool for cutting hard steel should be made as hard as possible." I don't think I said that, but having no means of knowing at hand, I will assume that what I did say was in substance that such a tool should be used without drawing the temper, and to his question whether "the tool is to have any rake?" I say yes, any shape that he finds desirabie to use. And when he asks if I can "use a milling cutter in this way," I say again, yes; but I have not advised the use of milling cutters in that way. It would be a nice point to make every time, to harden milling cutters so that the right degree of hardness and tenacity should be combined. I contend, however, that in lathe and planer tools there is not the slightest difficulty in learning the heat at which to harden any good tool steel so that the temper need not be drawn. As to "the best steel, *' * * so far as hardening is concerned" being difficult to anneal, it follows that hard steel will not anneal to work as easily as the softer grades with the same tools. I believe, however, that all tool steel which it is found desirable to use—unless it be Mushets—may be annealed to be readily worked with suitable tools. The old adage, "If the tool is dull put forth more strength," should be dropped in these days, and in the machine shop I would suggest as a substitute: If the material to be cut is hard use better material for tools and take more pains in making them. S. W. GOODYEAR.

William Kent, who has had charge of the Pittsburgh office of the Babcock & Wilcox Co. for the sale of their water-tube steam boilers, has been transferred to the general office in New York as superintendent of the sales department. William F. Zimmerman has been appointed manager of the Pittsburgh office.

Rieppel's Drilling Machine.

The engravings, Figs. 1 and 2, represent a drilling machine made by John Rieppel, of Gaines, Tioga County, Pa., for the purpose of drilling boilers or other cylindrical objects by power from the inside. In Fig. 1, the machine is shown as ready for use. *A* represents a base piece made with a journal stud *b*. This base piece is provided with radial arms *a*, with threaded ends and nuts *a'* made with conical projecting ends, as shown at a^2. One of these pieces is used at each end of the machine when convenient, their use for centering and holding the frame being apparent. When not convenient to use two of them, one end of the frame is sustained as shown in the engraving, or in some other manner that may suggest itself. The casting *B* is made in two pieces, and is provided with a bearing for the pin *b*, and holds the ends of the rods, *C*, *C*. The actuating shaft *G*, carries the bevel wheel *g*, more clearly seen in Fig. 2, which drives the drill spindle. The ends of the spindle are of different lengths, for convenience in reaching to different distances. The crosshead *E*, may be slid along as required on the rods, and the revolving frame and drill turned around to different positions. Other parts of the device are so clearly seen in the engravings as not to require description.

The Pennsylvania Railroad Company have secured the right from Mr. Rieppel to use this machine on all their roads. The foreman of their Renovo machine shop writes us: "We use it with great economy, in drilling and reaming holes for bolting locomotive cylinders to boiler. With it two men have drilled, reamed and bolted a pair of 'Class I' cylinders to boiler complete in five hours. This includes drilling the cylinders as well as the sheet, for we do not find it profitable to have cylinders drilled before being fitted to boiler."

Fig. 1

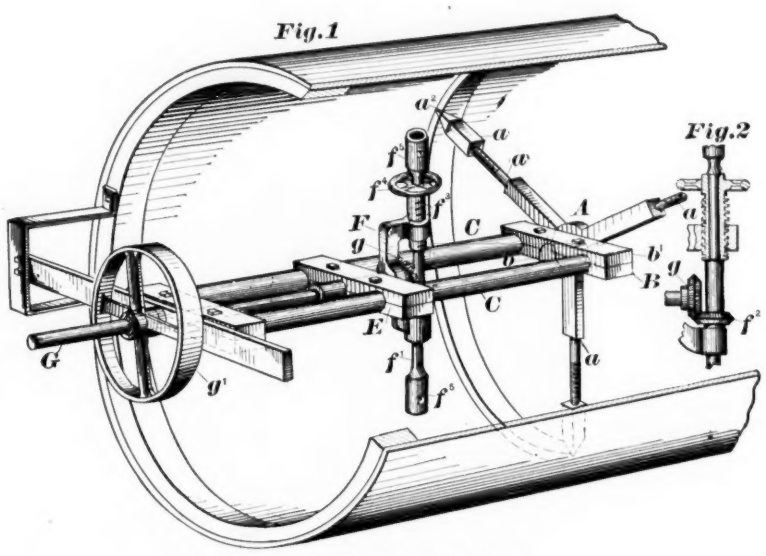


Fig. 2

RIEPPEL'S DRILLING MACHINE.

Kansas City, Mo., Urbana, Ill., South St. Louis, Mo., and Fall River, Mass., have organized branch associations of engineers tributary to the National Association of Stationary Engineers, which holds its annual convention in Chicago, Ill., Oct. 2, 1883.

The big locomotive, El Gobernador, being built at Sacramento with the Stevens valve motion, will not be ready for several months.

Torsional Tests of Tool Steel.

Editor American Machinist:

We notice in your issue of August 11th a copy of the torsional tests of round tool steel, recently made by the Pratt & Whitney Company, of Hartford, and being one of the firms enlisted in the test, we are naturally a little sensitive upon the reputed results.

The idea of establishing some such test as this, to determine the relative merits of the steels frequently offered for sale to the Pratt & Whitney Company, originated with Mr. Parkhurst, the superintendent of the tap and die department. Too much credit cannot be given this gentleman for the skill and ingenuity displayed by him in the construction of a machine, in all respects the most complete for the purposes intended that has ever been made. Our interest in the test which was proposed was, of course, of a competitive character. We had been supplying the Pratt and Whitney Company with all of their steel, but if beaten in this contest we might expect to abide by the consequences. When about to begin his experiments, Mr. Parkhurst ordered from us some $\frac{3}{4}$" round tap steel, his stock of this size being entirely exhausted. By a misunderstanding in our office, a small amount was hastily prepared and sent him by express. The quantity was insufficient for the purpose, and Mr. Parkhurst having gone so far with his preparations that he could delay no longer, used some of our round tool steel, which he happened to have of the proper size, but otherwise not adapted to the making of taps.

The test was completed with the result as shown in your table. Subsequently, when his attention was called to our position in the matter, Mr. Parkhurst cheerfully consented to do what he could to set us right, and made a test of our regular tap steel taken from the stock then in his rack. The result will be seen in the column marked B 2 of the accompanying blue print, which was sent us by the Pratt & Whitney Company. By this it will be seen that our rank is *first* instead of *fourth*, and that the question of the relative merits of English and American steel is quite conclusively settled.

Another point to which we would call your attention is contained in the comparison of the annealed section of the table to the hardened. The claim of superiority is by all steel workers assigned to that steel which shows the widest difference between the annealed and hardened state, the reason being that such a steel must be freest from manganese and other elements which, while tending toward hardness impair its strength, and upon which the action of the annealing process has no effect whatever. The test in question furnishes a nice illustration:

	Hardened.	Annealed.	Difference.
Atha.....	1,372¾ lbs.	777⅞ lbs.	595 1/8 lbs.
Spaulding & Co.	1,535	744	791
Jonas & Colver.	1,469¼	793 1/8	675⅝
Thos. Firth....	1,403¼	762 7/8	640¾
W. Jessop.....	1,266⅛	861 5/8	405

By a comparison of these figures it will be seen we are fairly entitled to what we claim, and knowing your disposition to instruct your numerous readers only in that which is strictly within the limits of facts, we ask you in justice to ourselves to publish the accompanying table.

SPAULDING, JENNINGS & CO.
West Bergen Steel Works,
West Bergen, N. J.

TABLE OF TORSIONAL TESTS OF STEEL.

	No. of Test.	ROUND TOOL STEEL OF THE FOLLOWING BRANDS: B. Atha & Co. A	Spaulding, Jennings & Co. B 1	Spaulding, Jennings & Co. B 2	Jonas & Colver. W	Thos. Firth & Sons. F	Wm. Jessop & Sons. J
Unannealed. Direct from bar.	1.....	853	864¾	854	894½	790	954¾
	2.....	855¾	768	849	887¾	863	916½
	3.....	840	861	850	896	809½	931¼
	4.....	849½	872½	838	900	856½	896
	5.....	853½	884¾	837	896½	857½	916¾
	6.....	849½	873	835	877	....	900
	Total...	5,101¼	5,124	5,054	5,351¾	4,176½	5,515
	Average	850 5/24	854	842⅓	891 23/24	835 3/10	919⅙
Annealed. 24 hours.	1.....	769	645	761	833¼	759¾	891½
	2.....	774	770	708½	813	758½	869½
	3.....	790	770	746¾	789¼	765¾	805
	4.....	773	762	751½	784	764½	859
	5.....	792	581½	738	773	767½	894½
	6	768	600	764	771	759½	849
	Total...	4,666	4,128½	4,469¾	4,763½	4,575½	5,168½
	Average	777⅔	688 1/12	744	793 11/12	762 7/12	861 5/12
Hardened. Medium straw color.	1.....	1,349½	1,440	1,533½	1,180	1,352	1,330
	2.....	1,400	1,166½	1,601	1,456	1,430	1,309
	3.....	1,402	1,560	1,501	1,349	1,402	1,215
	4.....	1,434	1,606	1,563	1,630	1,427	1,247
	5. ...	1,550	1,302	1,449	1,500	1,480	1,254
	6	1,101	849	1,564	1,702	1,329	1,243
	Total...	8,236½	7,923½	9,211½	8,817	8,420	7,598
	Average	1,372¾	1,320 7/12	1,535	1,469½	1,403⅓	1,266⅓

AMERICAN MACHINIST

PUBLISHED WEEKLY

BY

American Machinist Publishing Co.

HORACE B. MILLER, Pres't.

JACKSON BAILEY, Vice-Pres't.

LYCURGUS B. MOORE, Treas. and Sec'y.

96 Fulton Street, New York.

JACKSON BAILEY, Editor. HORACE B. MILLER, Business Manager.

F. F. HEMENWAY, ANGUS SINCLAIR, } Mechanical Engineers.

The American News Company,
Publishers' Agents, New York.
The International News Company,
11 BOUVERIE STREET, (Fleet Street), LONDON, ENG., will receive subscriptions for the AMERICAN MACHINIST at 16/8 per annum, postage prepaid.

DEALERS SUPPLIED BY

The American News Company, New York.
The American News Company, Denver, Col.
The American News Company, Kansas City, Mo.
The American News Company, Omaha, Neb.
The American News Company, St. Paul, Minn.
The New York News Company, New York.
The National News Company, New York.
The New England News Company, Boston, Mass.
The Central News Company, Philadelphia, Pa.
The Western News Company, Chicago, Ill.
The St. Louis News Company, St. Louis, Mo.
The Cincinnati News Company, Cincinnati, Ohio.
The Detroit News Company, Detroit, Mich.
The Pittsburgh News Company, Pittsburgh, Pa.
The Baltimore News Company, Baltimore, Md.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Co., San Francisco, Cal.
The Brooklyn News Company, Brooklyn, N. Y.
The Williamsburgh News Co., Brooklyn, E. D., N. Y.
The Newark News Company, Newark, N. J.
The Northern News Company, Troy, N. Y.
The Albany News Company, Albany, N. Y.
The Washington News Company, Washington, D.C.
The New Orleans News Company, New Orleans, La.
The Montreal News Company, Montreal, Canada.
The Toronto News Co., Toronto, Ontario, Canada.
The Toronto News Co, Clifton Branch, Clifton, Ontario, Canada.

SUBSCRIPTION.

$3.00 a year, in advance, postage prepaid in the United States and Canada.
$4.00 to Foreign Countries, postage prepaid.

ADVERTISING.

Transient, 35c. per line each insertion.
"Business Specials," 50c. a line.

EDITORIAL ANNOUNCEMENTS.

☞ *Positively we will neither publish anything in our reading columns for pay or in consideration of advertising patronage. Those who wish to recommend their wares to our readers can do so as fully as they choose in our advertising columns, but our editorial opinions are not for sale. We give no premiums to secure either subscribers or advertisers.*

☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery; nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, SEPTEMBER 1, 1883.

CONTENTS.

PAGE

Motive Power and Traction Machinery of the the New York and Brooklyn Bridge.....1-2-3
Metalization of Wood..... 3
Macdonald's Hydrostatic Leveling Instruments 4
The Curtis Expansion Trap..... 5
Extended Smoke-Box..... 5
File-Truing Device..... 5
The Milling Machine, Its Construction and Uses—By John J. Grant..... 5
Letters from Practical Men.—Twist Drill Grinding Machines-Proposed Form of Lip-The Twist Drill as a Substitute for the Rose Bit.—A Time-Card System.—Endurance of Steel Plate Boilers.—Hardening Steel with Cyanide 6
Torsional Tests of Tool Steel..... 7
Encouraging Local Manufactures..... 8
Interesting Experiment with Boiler Evaporation..... 8
Literary Notes..... 8
Questions and Answers..... 9
Manufactures..... 9
Machinists' Supplies and Iron..... 10

Encouraging Local Manufactures.

We have no desire to scold the press, but it is worthy of note, that of all the daily and weekly journals of a non-technical character, which we number among our exchanges, comparatively few seem to make the chronicling of local manufacturing news a distinct and noteworthy speciality. What they do find to report in this direction is too often so sandwiched in among neighborhood gossip and personal items, that it can be found only after careful search. If it be asked what is meant by manufacturing news, we do not so much mean that John Smith had his hand scalded by escaping steam, or his foot crushed by a falling stone, (either of which misfortunes distinctly chronicled in its proper column, is doubtless of interest to many local readers), as to know what is being done, and what is talked of, and what is thought to be needed, in the way of extending existing manufactures, building up new manufactures, opening up new channels of trade, inaugurating new shop systems, improving the prospects of workingmen, and other like events, which mean better business or more of it. We trust some of our city and country exchanges will appreciate the need of bringing industrial matters to the fore, and of grouping them in a distinct and easily-found department, where they will be brought to the attention of the outside world, which must supply the men and money, if the towns in question are to grow into industrial centers.

That the Governor of a manufacturing State like Connecticut, should have found it necessary to regard the warnings of officious friends, and to explain his reasons for daring to be present at the ceremonies attending the opening of a new industrial establishment, as occurred recently at the new Wilson sewing machine works at Wallingford, is evidence, both as to the good sense of the chief magistrate, and as to a too general prevalence of the view that industrial events have no special importance.

Should one or a dozen rival establishments be opened in the same town, doubtless the Governor will regard the opening festivities as equally worthy of his appreciative attention. If more of our public men profit by Governor Waller's example, they will have opportunity to render the communities which they are supposed to represent, something like real service. And indeed it is not likely that the interests of substantial politics will be any the worse served by such action, for even governors and senators should know that filling up towns with thriving manufacturing establishments, among its other and more significant meanings, means the making of votes.

Interesting Experiment with Boiler Evaporation.

Mr. T. W. Peeples, general master mechanic of the Manhattan Elevated Railway, has been engaged in a series of interesting experiments to test the evaporative service of boilers under varied conditions. The methods of investigation which he followed were in some instances quite unique.

A locomotive boiler employed to supply steam for driving part of the machinery at the repair shops was not evaporating so much water for the coal consumed as was considered desirable. J. D. Campbell, foreman of the works, who directed the experiments, believed that the flues were too numerous for efficient evaporation. He kept a record of the fuel used and the water evaporated in the ordinary working of the boiler, and ascertained that $6\frac{1}{2}$ pounds of water was evaporated for each pound of coal. While the boiler was doing this work, a vessel containing one gallon of water was placed in the fire-box, and the water evaporated in seven minutes and two seconds. The vessel was again filled and put into the smoke-box, where the water evaporated in thirty-eight minutes. This experiment was repeatedly tried, and the mean of the periods taken to evaporate the water did not vary materially from the time given.

Forty flues were then plugged throughout the center part of the boiler, and the experiments repeated. It was now found that the gallon of water placed in the fire-box evaporated in five minutes and forty-five seconds, while it took sixty minutes for it to evaporate in the smoke-box. This showed a remarkable increase of fire-box temperature, and decrease in the heat of the smoke-box. Under the last conditions the evaporation of water rose to $8\frac{1}{5}\frac{1}{5}$ pounds of water to the pound of coal. These figures are curious and startling. We would feel disposed to doubt their accuracy were they not made by thoroughly reliable engineers, who know perfectly what they are about.

Several experiments were made where tin, lead, and antimony, with their compounds, were used to find the fire-box and smoke-box temperatures, but they did not act so reliably as the water vessel.

One can scarcely look over the pages of any daily newspaper without meeting with the particulars of men being injured or killed by the fall of an elevator. An elevator is not dangerous of itself, but is only dangerous when neglected or put up in a criminally careless manner. Boiler explosions and railway accidents are falling behind elevators as destroyers of life and limb. If a few owners of elevator traps were sent to the penitentiary for criminal carelessness or manslaughter perhaps the action would lead to the overhauling of some elevators needing repairs.

The management of the Northern Pacific Railroad have issued an order forbidding the issuing of passes to parties who visit the country tributary to that road for purposes of settlement, to parties who propose to start new industries, as well as to parties who propose to erect elevators, mills or other buildings. It is doubtful, even if the railroad could afford it, whether such artificial stimulation for the future would be able to do as much for the development of the country as the adoption of and strict adherence to a fair and square business policy in dealing with agricultural and industrial interests. Many railroad managers seem to consider nothing beyond the present moment in adjusting such matters as freight and passenger charges, car and train service, terminal, side-track and warehouse facilities and the like. If these are inequitable, insufficient or uncertain, it will take a great deal of coddling in the way of free passes and aids to immigration to supply their place as a means of peopling new States and filling them with manufacturers.

A few years ago key seating machines were used in but a very few shops; now they are recognized as essential to the proper equipment of a considerable portion of shops doing regular machine work. They are made by several establishments, and the demand for the last year or two has been very good.

The Boston *Commercial Bulletin* says:

"There is at the present moment but one establishment in California at which jute is manufactured into grain bags. This is the factory at the State Prison in San Quentin, where operations net a monthly profit of from $4,000 to $5,000."

In view of the outcry raised by prison contractors and their agents urging that the abolition of the contract system would result in having to "support prisoners in idleness," making them a "burden upon taxpayers" the above item is quite interesting. California is the only State that has abolished the State Prison contract system, and the $4,000 to $5,000 monthly profit on making bags goes into the treasury of the State instead of the pocket of some favored contractor. Furthermore no injury is done to any industry carried on in the State.

The people of the State of New York are to vote upon the question of abolishing the prison contract system next November. The decision is likely to be that the contractor must go.

Electrical appliances are making rapid headway in Europe as mining conveniences. We are all familiar with the horrors of fire-damp explosions, which have so frequently hurled hundreds of human beings into eternity. A great part of such explosions have originated from exposing the flame of miners' lamps to the noxious gas. In the best regulated mines this is going to be no longer a menace to life and property. Electricity is taking the place of the miners' lamp, and the sombre subterranean passages of the deepest mines are getting lighted up with cheerful brilliancy. By aid of electricity great improvements are also being effected in the methods of signaling. The usual means of signaling between the surface and the workings have been by means of wires operating a striking hammer. In very deep mines this method was extremely defective, for the transmission was tardy and the wires were liable to break, which entailed numerous delays. The electric system is prompt, and the wires can be placed where they are not subject to frequent breakage. Then they can be extended to the farthest points of the workings, where communication can be made in a simple way.

Literary Notes.

DYNAMO ELECTRIC MACHINERY, A SERIES of lectures by Professor Silvanus P. Thompson. Reprinted from the *Journal of the Society of Arts*. D. Van Nostrand, New York.

This little book is likely to prove a welcome addition to the growing literature on electricity. The development of electrical appliances has been so rapid during the last few years, important discoveries and inventions have followed in such rapid succession that the literature of electricity fell far behind the progress of the art. The demand for knowledge on electrical engineering became so urgent that many writers entered the field as teachers who ought to have remained students.

These lectures were prepared by one who thoroughly understood his subject, and as a master he conveys to the reader his own knowledge of dynamo-electric machinery.

Prof. Thompson loses no time explaining what electricity is, but he proceeds in a very clear and concise way to show its varied methods of application, especially the department of electro-magnetic induction discovered by Faraday. He describes the method of action of the leading dynamo-electric machines in a plain common-sense manner that will be highly appreciated by men working into a knowledge of these matters. Electro motion is also treated, and the gradual development electro-magnetic induction from the experimental to the practical stage is traced. We commend the book to mechanics interested in electricity as worthy of attention.

One of the brightest and most promising additions to the list of trade journals is the *United States Stationer and Fancy Goods Reporter*, just started and to be published weekly by William E. Nickerson, 141 Eighth street, New York. It is neatly printed and is full of live information pertaining to its specialty, in the form of both correspondence and brief notes. It starts with a good advertising patronage, and remarks editorially that it has "come to stay."

The *Dallas* (Texas) *Machine Journal*, in its first issue, makes the following appeal to the mechanical public: "As this is, we believe, the first attempt at a home (Texas) mechanical journal, if we will be pardoned for calling it a journal, owing to its size and insignificance, we ask our readers to look upon us kindly and charitably, as you would any young animal, for instance a little pig; and if you will be kind and wait on us, before a year we will become quite a hog, and will endeavor not to be a bore."

W. Simpson, P. O. Box 46, East Boston, Mass., has issued a second edition of his Manual of Screw Cutting, price 20 cents, or in cloth cover 30 cents, by mail. It gives a quick and simple method of finding the change gear to cut any possible thread per inch or per pitch, with two or four gears. Every machinist not fully familiar with screw-cutting principles should have a copy.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

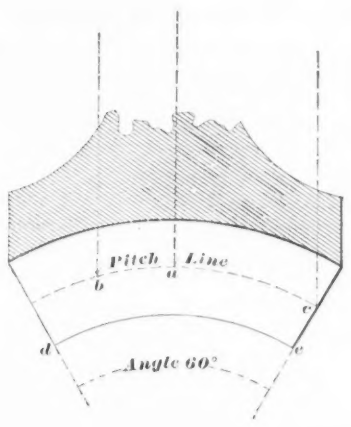
(283) T. D., New York, writes: A says a double thread ½" pitch screw is a double two thread, and B says it is a double four. Which is right? *A.*—We should say that A was substantially right, but would suggest calling it a double thread, ½" pitch.

(284) F. H. S., Pittsburg, Pa., asks: Will you tell me of an alloy that will melt at 160° temperature? *A.*—It is said that an alloy of 3 *volumes* (not parts by weight) of cadmium, with 4 each of tin, lead and bismuth, will melt at a little less than 160°.

(285) S. D., Brooklyn, N. Y., asks: Is it impossible to make an injector that will lift and feed a gallon of water for every gallon exhausted, stopping and starting itself? *A.*—It, perhaps, would not do to say that it is impossible, but it would be very difficult of accomplishment.

(286) H. F. H., New York, writes: I have a tubular boiler upon which I carry 90 lbs. steam pressure. Twelve feet from this boiler I have a tank 4 feet square. In the 1½" pipe between the boiler and tank is a pressure regulator. I reduce the pressure in the tank to 35 lbs. to run an engine. Steam of 90 lbs. pressure has a temperature of about 325°, and steam of 35 lbs. about 261°. What will be the temperature of steam in the tank, which is constantly supplied from the boiler at 90 lbs? *A.*—Except that the steam may be slightly superheated by wire-drawing, the temperature in the tank will be that due to a pressure of 35 lbs. The steam in the tank is expanded, and the heat that was in the steam at 90 lbs. is diffused through a greater quantity.

(287) Tool-Maker, Stillwater, Minn., asks: 1. What is the pitch diameter of a worm-wheel .75 inch pitch, containing 35 teeth? *A.*—We suppose you refer to where on the pitch line the diameter should be measured. In making such wheels, we have always measured the pitch diameter at a

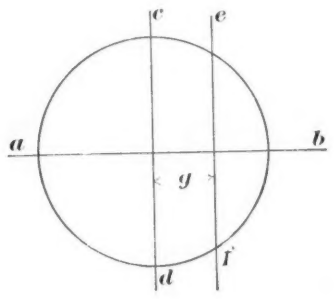


point between the least and greatest diameter, as at *b* in the sketch. Others, again, measure it from *c*, and still others differently. John J. Grant, of the firm of Grant & Bogert, informs us that he considers it better to make the diameter right, as at *a*. The pitch diameter, then measured from *a*, would be 8.355 inches. 2. What would be the total diameter? *A.*—Measured across *a*, 8.832 inches. 3. What should be the width of the wheel for a worm 3½" diameter? A.—The radial lines, *d*, *e* (drawn from the center of the worm), should make an angle of 60°. 4. Is there a rule for cutting bevel gears? *A.*—The process cannot be stated as a rule.

(288) C. B., Kansas City, Mo., asks: 1. What is the rule for the velocity of steam flowing into the atmosphere? *A.*—A rule deduced from Nystrom's formula is: Divide the pressure above the atmosphere by the weight of a cubic foot of steam at that pressure, and multiply the square root of the quotient by the constant number 96, which will give the velocity in feet per second. 2. If a given quantity of water pass through an orifice under a pressure of 20 lbs. per square inch, how much more air under the same pressure will pass through the same orifice? *A.*—There is not sufficient data from which to calculate very accurately. Probably, in cubic feet, about 25 times as much. 3. In the Worthington duplex pumps, do the valves have outside and inside lap and lead? *A.*—Very little lap and no lead, according to the common understanding of the term. 3. I notice in a large duplex pump here that there is lost motion in the tappets on the valve stem. Is this intended or accidental, and if intended, what is the purpose? *A.*—It is purposely made so. In the valve motion of the Worthington pump one piston acts to give steam to the other, and the arrangement of valve motion is such that each piston stops at the end of its stroke, giving time for the valves to seat quietly. One steam valve being always open, there are no dead points.

(289) G. R. S., Waltham, Mass., asks: 1. Can a wheel 4 feet diameter, rim ⅝" wide and 3-16" thick, with 15 spokes tapering from ⅛" or ⅜" to ¼", wheel to be dished 3", be cast in either iron or steel? *A.*—We have no doubt it would be possible to cast such a wheel, but think it will be difficult to find any one anxious to make it. 2. Would it be safe to use a cast-steel front end and fire-box, ⅜" thick, for a vertical boiler 12" diameter and 3 feet high, 24 tubes 1" diameter, the steam pressure to be 80 lbs.? *A.*—We should not recommend the use of such material. 3. Would a three-cylinder engine, 1½" bore and 3" stroke, geared 3 to 1, boiler pressure 70 lbs., be large enough to propel a tricycle at a fair speed up-hill, the driving wheels to be 4 feet diameter? *A.*—No. 4. How is the oil feed arranged in the fire-box of a boiler? *A.* The oil is admitted through a finely-perforated tube. 5. Is petroleum the crude base of common kerosene oil? *A.*—Kerosene oil is one of the products of petroleum.

(290) J. L., Middleboro, Mass., writes: I am building a yacht engine, and wish to make both eccentrics in one piece. The steam ports are 5-16"; bridges, 5-16"; exhaust port, ⅝". What I want to know is how to locate the centers of the eccentrics to turn them? *A.*—You do not say whether you use a link or not. We assume, however, that the full travel of the valve is equal to the throw of the eccentric. To determine the locations of the centers of the eccentrics, draw the circle, as



in cut, for the throw of the eccentrics. Assume the crank to be at *a* or *b*, according as you do or do not use a rock shaft. Then draw the line *c*—*d* at right angles to *a*—*b*. If there were no lap or lead to your valve, the location of the center of the eccentrics would be at *c* and *d*. Lay off from *c*—*d* the distance *g*, equal to the lap and lead of the valve, and draw the line *e*—*f* parallel to *c*—*d* and at right angles to *a*—*b*. Where the line *e*—*f* cuts the circle will be the location of the centers from which to turn the eccentrics. It is hardly necessary to mention that the center of the circle is also the center of the hole in the eccentrics. You can draw these lines directly on the eccentrics.

BUSINESS SPECIALS.

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

James W. See, Consulting Engineer, Hamilton, O.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N.J.

The latest Improved Match Machinery is made by the White Machine Co., Waterbury, Conn.

Mechanical and patent drawings on short notice. W. G. Chapin, 305 Nostrand avenue, Brooklyn, N.Y.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Steam Economy—124 pp., in boards. By mail, $1. A. Wilkinson, Manayunk, Pa.

Universal grinders for lathe-centers, chucks, angles or cylinders. C.C.Hill, 144 La Salle st., Chicago, Ill.

Chas. T. Porter, Mechanical Engineer, Tribune Building, (Room 42,) New York City.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

For sale, 25" lathes of best designs from new patterns. George A. Ohl & Co., E. Newark, N. J.

Patents.—Franck D. Johns, Att'y at Law & Solicitor of Patents, 617 Seventh St., Washington, D. C.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Latest and best books on Steam Engineering. Send stamp for Catalogue. F. Keppy, Bridgeport, Ct.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

Parties desiring 18" engine lathes will find it to their advantage to correspond with James A. Fuller & Co., 3 Cyprus street, Worcester, Mass.

William J. Baldwin, consulting engineer in Steam Heating and Ventilation. Author of "Steam Heating for Buildings." Office, 96 Fulton st., New York.

Castings furnished for 18" and 21" swing engine lathes. Gearing turned and cut if desired. C. F. Batt, Phœnixville, Pa.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Currier & Snyder, Worcester, Mass., manufacturers of improved labor-saving upright drills, 24" and 26". A specialty circular and price on application.

Young men wishing to take a mechanical course or learn the machinist's trade, call or address School of Mechanical Instruction, No. 195 Front street, Worcester, Mass.

"Patent Binder" for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address by mail for one dollar. American Machinist Publishing Co., 96 Fulton street, New York.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

Business men furnished stenographers, who are machine operators, without charge for my services. Shorthand taught by mail. Caligraphs sold; special inducements offered; correspondence solicited. W. G. Chaffee, Oswego, N. Y.

BOUND VOLUMES of the AMERICAN MACHINIST for 1880, 1881, and 1882. A limited number of each sent by express for $4 per volume, express charges to be paid by purchaser. AMER. MACHINIST Publishing Co., 96 Fulton st., New York.

We will pay 25c. each for copies of January 1st and 8th, 1881. They must be clean and in good condition. Any of our readers who are kind enough to send either of the above dates, will please write their name and address on the wrapper. AMERICAN MACHINIST Publishing Company, 96 Fulton street, N. Y.

Wanted—Correspondence with engine builders, boiler makers, and supply dealers in steam goods. We manufacture the *cheapest* Injectors and best Steam Jet Pumps in this country, and offer to *live men* the most liberal terms ever named. Drop postal for particulars to J. B. Sheriff, Son & Co., 68 Water St., Pittsburg, Pa.

The "Lancaster" new patent tools, viz., Screw Plates; Pipe Cutters, with and without Burr Scrapers; Wrenches; Pipe inside Burr Reamers; Drill Chucks; Combined Punch, Shears, Anvil, and Rod Cutters, &c.; all newly designed and highly efficient. For agencies, illustrated circulars, and liberal discounts, apply to Lancaster Mfg. Co., 36 Dey st., N.Y.

"Useful Information for Steam Users"—a 100-page illustrated pamphlet, carefully compiled from the best authorities, on the care and management of the steam engine and boiler, with hints for engineers and firemen. Engineers everywhere should have this work. Send 25 cents in P. O. stamps for a copy. The J. N. Mills Publishing Co., 145 Broadway, New York.

Chordal's Letters.—John Wiley & Sons, 15 Astor Place, New York, have now ready a new and enlarged edition, with six additional plates, of Chordal's Letters, comprising the choicest selections from the series of articles entitled "Extracts from Chordal's Letters," which have appeared in the columns of the AMERICAN MACHINIST; with a steel portrait of the author, and upwards of fifty original illustrations by Chas. J. Taylor. One volume 12 mo. of nearly 400 pages, cloth, $2.00. Will be mailed and prepaid on the receipt of the price.

Credits.—Ealy's "Blue Book," July, 1883, just published, contains a complete classified list of over 100,000 names of machinists and dealers in machinery, railway machinists, engine and boiler makers' supplies, brass goods, metal, etc., in United States and Canada. The book is condensed making it much more convenient to handle than a larger agency book. It gives the financial standing and paying qualities of all dealers and manufacturers in the above-mentioned lines of trade. For terms, etc., address The John W. Ealy Company, 51 Chambers street, New York, or 79 Dearborn st., Chicago, Ill.

MANUFACTURES.

The Charles Parker Company, of Meriden, Conn., is building a new 60x100 feet brick factory.

The Stonington (Conn.) Cutlery Company will soon erect a three-story brick factory 280x42 feet.

The Frances Manufacturing Company, of New Britain, Conn., will build another foundry 130 by 40 feet.

The Co-operative Foundry Company, Kingston, Mass., are about making an addition to their works.

Wilcox, Crittenden & Co., Middletown, Conn., are making preparations to build a new workshop 60x80 feet.

Mason & Barker are erecting malleable iron works in Worcester, Mass. They will start up in September.

The Brown & Van Arsdale Manufacturing Company, of Chicago, are adding another story to their machine shop.

The Roanoke Machine Company, at Roanoke, Va., are erecting car and locomotive works to employ 1,000 men.

The Whitinsville (Mass.) Machine Works are building an extension to their works, 360x82 feet and three stories high.

The Medart pulley is to be manufactured for Germany by C. H. Haubold, Jr., Chemnitz, Saxony, under Mr. Medart's patents.

D. N. Melvin, Linoleumville, Staten Island, N. Y., is building and selling his compound engine, which is giving good satisfaction wherever it has gone into use.

Subscriptions are being raised to put up a first-class cotton and woolen factory in Meridian, Miss. The amount desired to be raised is $150,000. Already $50,000 has been subscribed.

The White Machine Company, Waterbury, Conn., are now supplying the plant for three establishments engaging in the manufacture of matches. Inquiries are coming in from all parts of the country.

W. P. Davis, North Bloomfield, N. Y., reports fewer sales and less inquiry during the past six weeks than formerly. He writes us that two of his machines (key-seaters) went to New Zealand a few days ago.

The Boston and Lowell Railroad Corporation are about to erect a new repair shop at Lowell, Mass. The new building will be of brick, one story in height, with a front of about 300 feet and a width of 100 feet.

Grant & Bogert, Flushing, N. Y., have closed a contract with E. E. Garvin & Co., New York City, to furnish the latter firm all the iron castings they may require for one year. Garvin & Co. employ 125 men in the manufacture of machine tools.

The new Chicopee Falls (Mass.) Screw Company, who are to manufacture gimlet-pointed wood screws, expect to be ready for business within two months, as the buildings are finished and ready for the machinery, some having already been placed in position.

The Lancaster Manufacturing Company, 36 Dey street, New York, whose illustration of small cutting and punching machines appeared in a recent issue of the AMERICAN MACHINIST, inform us that they are about bringing out several new tools for cutting off and threading pipe.

Howard Bros., Fredonia, N. Y., have issued a new illustrated catalogue of their Durrell Improved Nut Tapper. The improvements consist in better finish and style; also in method of placing oil cups on the wrenches. They write us that the tool is giving A 1 satisfaction, and that they are having heavy sales in all styles.

Charles A. Maynard, Northampton, Mass., has bought an idle manufactory, and will start the manufacture of hoes, shovels and trowels, employing 100 men at first, intending to double the force before long. He is also planning to start a lighter business in the remainder of the building before long, which will furnish work for 200 more people.

Kearney & Foot, 101 Chambers street, New York are building new file shops on an acre of land recently purchased of the Erie Railroad in Paterson, N. J. The buildings now being erected represent only half the plant, and will be used for forging, grinding and annealing. The large building will be of stone and brick, with frame where most light is required, covering 130x30 feet of ground. The other building will be 50x80 feet. The works will be still further extended at a later date. They are full of work, running 125 hands.

The Dallas Iron Works (Phelan & Co.), Dallas, Texas, seems to be an enterprising establishment. They have undertaken to publish the *Dallas Machine Journal*—a monthly machinery newspaper for machinery owners and operators in Texas. The first number is creditable, and we wish it abundant success. They manufacture architectural castings; also execute engine, boiler and machine work, and general job work in their line. Brass castings are also included in their specialties. They have increased their capital by the addition of two men to the firm, and are building an addition to their shops.

Watts, Campbell & Co., Newark, N. J., report business good. Recent orders for their Corliss steam engines include one 18x42, from the United States Illuminating Company; one 20x48, from Geo. F. Hall; one 14x32, from M. & H. Schrenkheisen; one 14x32, from Althouse Iron Works; one pair 20x48, from Wm. Wicke & Co.; one 20x42, from Wynkoop & Hallenbeck; one 24x56, from Brush Electric Illuminating Company; one 18x36, from L. Prahar & Bro.; one pair 18x42, from Trinity Church Corporation—all the foregoing being in New York City. Also one each from Wm. O. Headley & Son, Wm. T. Mersereau & Co., and H. M. Strieby & Co., all of Newark, N. J.; together with one 26x48 from the Fairmount Worsted Mills; one 18x42, from Thomas Jaggers, Philadelphia, and two 24x48, from the Conglomerate Mining Company, Philadelphia, the engines being sent to Lake Superior.

The New York, West Shore and Buffalo Railroad are driving machinery in their shops in a novel and effective manner. Instead of belting from the engine to the line shaft in the usual manner, each shaft is driven by an independent engine, coupled directly to it. To effect this the arched doorway in the central brick partition is strengthened by piers, and a second arched opening left over it is similar to a transom. The floor of this opening forms the foundation for a Westinghouse engine, which is set with its centers exactly in line with the shafting, to which it is coupled on each side. No regular engineer is employed, but the engine is considered a part of the shafting, and is in charge of the wiper. The Westinghouse Machine Company have so far fitted up the shops at New Durham, N. J., with a 12" by 12"; at Kingston and Syracuse, N. Y., each with a 9" by 9"; and at Schenectady with a 7" by 7".

Among establishments recently furnished with Westinghouse engines are the following: Council Bluffs Water-Works, two of 100 H. P. each; National Bridge Company, Montreal, one of 60 H. P.; Pennsylvania Electric Light Company, one of 100 H. P.; Tucson (Arizona) Electric Light Company, one of 60 H. P.; Baldwin Locomotive Works, a reversing engine for steam crane; Penn & Lee, Syracuse, one of 40 H. P.; New York and Brooklyn Electric Light Company, one of 40 H. P.; Davis Church Organ Company, Buffalo, one of 20 H. P.; Solid Steel Company, Albany, one of 50 H. P.; Lewis Cook Carriage Company, Cincinnati; Cambria Iron Company, one of 100 H. P.; J. S. Heartt & Co., Troy, one of 60 H. P.; T. A. Willson, Reading, Pa., one of 30 H. P.; Utica (N. Y.) Match Company, one of 40 H. P.; R. H. Brown & Co., New Haven, one of 100 H. P.; Leader Sewing Machine Company, Cleveland, one of 60 H. P.; Plain City Paper Company, Piqua, O., three engines; Stewart Paper Company, Brookville, Ind., three engines; P. M. Brown, Mill Bridge, N. C., one of 50 H. P.; C. L. Blakeslee, Schenectady, one of 50 H. P.; Hitchcock & Bradley Bending Company, Ashtabula, O., one of 70 H. P.; H. J. Proctor, Ogdensburgh, one of 100 H. P.

Machinists' Supplies and Iron.

NEW YORK, August 16, 1883.

No material change is noticeable in the supply business since last week.

In iron we quote: No. 1 X Foundry, standard brands, at $22 to $23; No. 2 X, $19.50 to $20.50. Scotch Pig—Coltness, $23.75 to $24; Glengarnock, $23; Gartsherrie, $23.50; Summerlee, $23 to $23.50; and Eglinton, $21 to $21.50.

Antimony—Hallett's brand, 9¼c.; Cookson's, 10¼c.

The demand for Copper is moderate, with Lake at 15¼c. to 15½c.; other brands, 14c. and 14½c.

Lead, 4¼c., with limited transactions.

Tin has been in moderate demand in jobbing lots, and is held firm, at 22¼c. for Banca, 21c. to 21¼c. for Straits and Malacca.

In Spelter sales are small. Common Domestic sells at 4.40c. to 4.70c.; Refined, 8c. to 8¾c.; Silesian, 5c. to 5¼c

Boiler Plate sells as follows: Tank, 2¼c. to 2¾c.; Refined, 2¾c. to 3c.; Shell, 3¼c. to 3½c.; C H. No. 1 Flange, 4¼c. to 4½c.; extra Flange and Fire Box, 5¼c. to 5½.; Siemens Steel Plate, 5½c. to 6c.

WANTED

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue

Wanted—A situation by a competent mechanical draughtsman. Address, D, care AM. MACHINIST.

Wanted immediately—Twenty-five machinists; those used to machine tool-building work preferred. Grant & Bogert, Flushing, N. Y.

Wanted—A first-class draughtsman, familiar with locomotive work. Address, W. E. Good, Reading, Pa.

Wanted—Immediately, at Huntington, West Va., an experienced brass moulder. Address, with reference and terms, the Ensign Manufacturing Co.

A first-class pattern-maker, of steady habits, can receive employment at Morgan, Williams & Co., Alliance, Ohio. None others need apply.

Wanted—Situation by a first-class pattern-maker, capable of making his own drawings, and seeing his work through the shop. Address, Box 15, AM. MACHINIST office.

Wanted—A situation as foreman. A practical man will soon be at liberty to take a position as foreman of machine shop. Good references given. Address, Foreman, care of AMERICAN MACHINIST.

A young man, 22 years old, first-class education, practical steam-fitter, good knowledge of machinery and steam-fitters' supplies, desires a position. Best reason given for leaving last employer. Highest references as to honesty, ability, etc. Address, Advancement, AMERICAN MACHINIST.

Light and fine interchangeable machinery to order. Foot and power lathes; slide rests, &c. Catalogue for stamp. Edwd. O. Chase, Newark, N. J.

Wanted—A partner, a practical machinist, with about $1,800 capital. Address, Lock Box 97, Laconia, N. H.

Wanted—A partner with about $5,000, in a small machine shop and foundry within 10 miles of New York. A mechanic preferred. Address, Box 2, AM. MACHINIST.

For immediate delivery, 16", 18", 25" and 26" swing engine lathes from new patterns, combining all the best improvements, at exceedingly low prices. For cuts and prices, address J. B. Reed, Cairo, Ill.

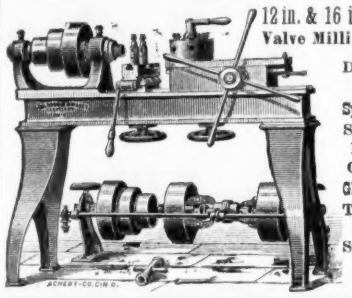
For Sale—Foundry, machine and blacksmith shops in the most live town in Southwest Iowa. Good shipping to Kansas, Nebraska and Missouri. Manufacture steam engines, house and railroad castings. Only small capital needed. Terms easy. Address, Iowa, care AM. MACHINIST.

For sale.—One-half or whole interest in Canadian patent that has netted inventors with $500 capital $50,000 in six years in the U. S. Reasons for selling, no time to develop Canada. To verify above statement, books open for examination. Address, with references, Edward Taggart, Grand Rapids, Mich.

Wanted—A hydraulic press of 100 tons capacity to take in work from two feet to five and one-half feet long and ten inches diameter, complete, with gauge pump and power attached. A second-hand press in good order would answer. State price, condition and send cut. Address, G. K., care of AMERICAN MACHINIST.

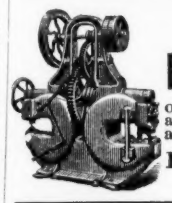
JOSIAH MACY'S SONS,
189 & 191 Front Street, New York,
MANUFACTURERS OF
LUBRICATING OILS,
Lard, Sperm, Whale and the
"UNICORN,"
Brands of all gravities, suitable for all grades of work; light, heavy, slow and high speed.
Samples Submitted Free. ESTABLISHED 1822.

T. NEW'S PREPARED ROOFING.
For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents Wanted. T. NEW, 38 John Street, New York.

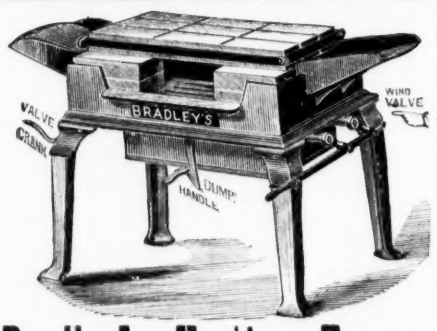
BRASS WORKING MACHINERY.

12 in. & 16 in. Monitors
Valve Milling Mach's
Double Key Lathes,
Speed Lathes
Slide Rests
Revolving Chucks for Globe Valves,
Two-Jaw Chucks,
Small Tools and Fixtures.
WARNER & SWASEY, Cleveland, O.

COOKE & CO., DEALERS IN
Machinery and Supplies,
22 CORTLANDT ST., NEW YORK.
AGENTS FOR

The Waters Perfect Governor.
Having Adjustable Speed, Automatic Safety Stop, Sawyer's Lever, and Solid Composition Valves and Seats. Also
SUPPLIES
For Machinists, Railways, Mills, Mines, &c.
Please send for circular and state that you saw the advertisement in this paper.


FOR A
COMBINED
Punch and Shears
of beautiful design, of great strength and capacity, and thoroughly reliable, address
Lambertville Iron Works,
LAMBERTVILLE, N. J.

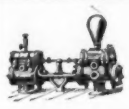
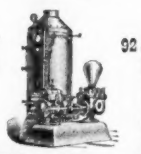
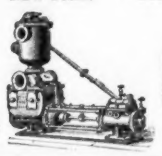
BOOKS —RELATING TO—
Steam Engines, Machinery, Heat, Gas, Electricity, Casting and Founding, &c.
DESCRIPTIVE CATALOGUE, 100 PAGES, 1883, SENT FREE ON APPLICATION.
E. & F. N. SPON, 35 Murray St., N. Y.



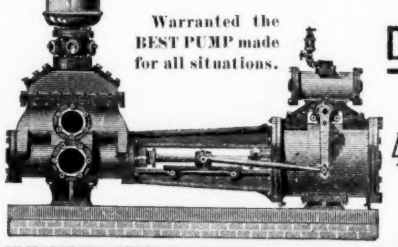
Bradley's Heating Forges,
FOR HARD COAL OR COKE,
BRADLEY & CO., - Syracuse, N. Y.

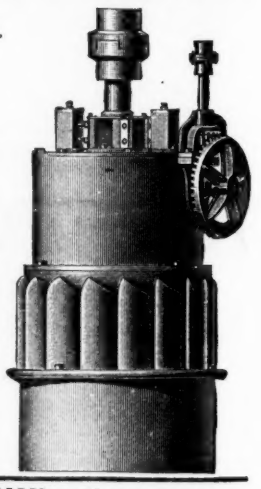
Non-Conducting Covering
For all Steam Heated Surfaces.
The Lightest, Cheapest and Best Covering in the Market.
C. C. COWPLAND & CO.,
744 Broadway, New York.

JUST PUBLISHED!
New and Complete Illustrated Catalogue,
OF BLAKE'S — IMPROVED — STEAM
PUMPING MACHINERY.
SEND FOR A COPY.
Address, GEO. F. BLAKE MANUFACTURING COMPANY,
95 & 97 LIBERTY STREET, NEW YORK. | 44 WASHINGTON STREET, BOSTON.


The Deane Steam Pump Co.
HOLYOKE, MASS.
Send for new Illustrated Catalogue.
92 & 94 Liberty St. NEW YORK. | 54 Oliver St. BOSTON. | 49 N. 7th St. PHILA. | 226 & 228 Lake St. CHICAGO. | 620 & 622 N. Main St ST. LOUIS.

MANUFACTURE
STEAM PUMPING MACHINERY
For Every Possible Duty.
INDEPENDENT CONDENSING APPARATUS
A SPECIALTY.


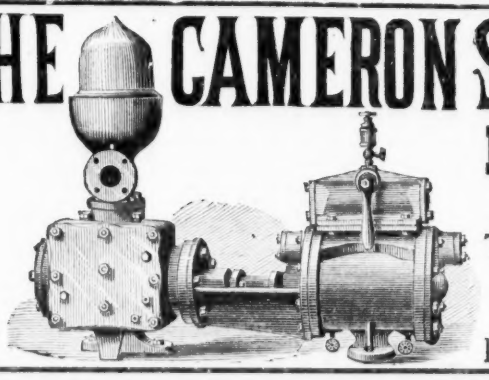
UNION STONE COMPANY,
Patentees and Manufacturers OF THE
UNION EMERY WHEEL.
EMERY, EMERY WHEEL MACHINERY AND TOOLS A SPECIALTY.
Automatic Knife Grinding Machines, Wood Polishing Wheels, Grinders' and Polishers' Supplies.
Catalogues on application. 38 AND 40 HAWLEY STREET, BOSTON, MASS.

THE
M. T. Davidson Improved Steam Pump,

Warranted the BEST PUMP made for all situations.
MANUFACTURED BY
DAVIDSON STEAM PUMP CO.
OFFICE AND WORKS:
41 to 47 Keap Street, Brooklyn, N. Y.
DANIEL KELLY, Agent,
51 North Seventh Street, Philadelphia, Pa.

THE HERCULES TURBINE
Gives more power for the same size, also better average results from full to one-half gate than any other water wheel ever made. It is moderate in cost, compact in form, and not liable to get out of order.

—BUILT BY—
THE HOLYOKE MACHINE CO.
SHOPS AT
Holyoke and Worcester, Mass.
Send for Catalogue, Circulars and Price List to either of the above places.

W. C. YOUNG & CO., Worcester, Mass.
MANUFACTURERS OF
ENGINE LATHES, HAND LATHES,
Foot Power Lathes, Slide Rests, &c.

A. F. CUSHMAN
MANUFACTURER OF
CHUCKS
HARTFORD, CONN. U.S.A.
All Sizes, Independent, 4-Jaw Combination Universal Geared and Lever. Brass Finishers' 2-Jaw, from 4 in. to 9 in., Chucks for Cutting-off Lathes, Screw Machines, and Amateur Lathes. Centering and Drill Chucks.
SEND FOR CATALOGUE.

THE CAMERON STEAM PUMP.

Is the Standard of Excellence
AT HOME AND ABROAD.
THE A. S. CAMERON
Steam Pump Works,
Foot of East 23d St., NEW YORK.

BETTS MACHINE COMPANY,
Wilmington, Del.
MAKERS OF
IMPROVED
MACHINE TOOLS
—FOR USE IN—
Railway & Machine Shops,
From Patterns of the most
MODERN CONSTRUCTION.

NICHOLSON FILE CO.,

SOLE MANUFACTURERS OF

FILES AND RASPS

HAVING THE INCREMENT CUT.

Also, FILERS' TOOLS AND SPECIALTIES.

"Nicholson File Co's" Files and Rasps, "Double Ender" Saw Files, "Slim" Saw Files, "Racer" Horse Rasps, Handled Rifflers, Machinists' Scrapers, File Brushes, File Cards, Surface File Holders, Vise File Holders, Stub Files and Holders, Improved Butchers' Steels

Manufactory and Offices at PROVIDENCE, R. I.- U. S. A.

TESTIMONIAL ON THE MERITS OF THE

PATENT NICKEL-SEATED "POP" SAFETY VALVE.

THE BABCOCK & WILCOX CO., 30 Cortlandt St.
NEW YORK AND GLASGOW.

NEW YORK, April 6th, 1883.

THE CONSOLIDATED SAFETY VALVE CO., 111 Liberty St., N. Y.

Gentlemen:

Our experience in Safety Valves has been a varied one, extending over 15 years, during which time we have tried nearly every valve placed on the market just long enough to become thoroughly disgusted with the working of each and every one of them. We learned all their faults and what to avoid. With this experience in our favor, we have designed quite a number of valves, which we hoped would overcome the difficulties we had met, but since trying the Consolidated Safety Valve Co.'s NICKEL-SEATED "POP" SAFETY VALVE, we have come to the conclusion that we can make more money selling boilers than we can in designing safety valves.

In 1882, we *bought over 300 of your 3", 3½" and 4-inch valves and still have the first complaint to make in regard to them*, and though costing us nearly *one hundred per cent. more than the best competing valve*, we consider it money well spent to adopt it for use *on all our work*. Expecting soon to send you further orders, we are, very truly yours,

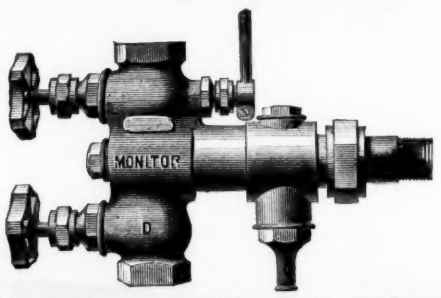
THE BABCOCK & WILCOX CO.
NAT. W. PRATT, TREAS.

MILLING MACHINES.

Universal, Manufacturing and Special.

C. E. LIPE, SYRACUSE, N.Y.

THE "MONITOR."



A NEW LIFTING & NON-LIFTING INJECTOR.

BEST BOILER FEEDERS IN THE WORLD.

FRIEDMANN'S

Patent Ejectors,

OR

WATER ELEVATORS,

For Conveying Water and Liquids.

Pat. Oilers & Lubricators, &c.

NATHAN & DREYFUS,

Patentees and Manufacturers,

92 and 94 Liberty Street,

NEW YORK.

Send for Illustrated Catalogue.

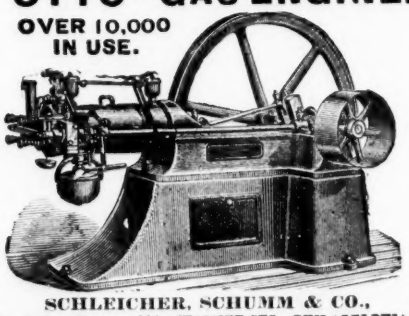
REVOLVING HEAD SCREW MACHINES — WITH PATENT AUTOMATIC WIRE FEED.

Of Extra Strength and Power, of a Superior Design and Finish.

WICACO SCREW & MACHINE WORKS, 712 Cherry St., Philadelphia, Penn.

"OTTO" GAS ENGINE.

OVER 10,000 IN USE.



SCHLEICHER, SCHUMM & CO.,

Main Office & Factory, 33d & WALNUT STS., PHILADELPHIA:

Branch Office, 214 RANDOLPH ST., CHICAGO.

Buffalo Cupola & Forge Blowers.

Warranted superior to any other make.

All sizes and styles for every class of work.

BUFFALO FORGE CO.

BUFFALO, N.Y.

Send for Catalogue and prices.

AKRON IRON COMPANY,

AKRON, O.

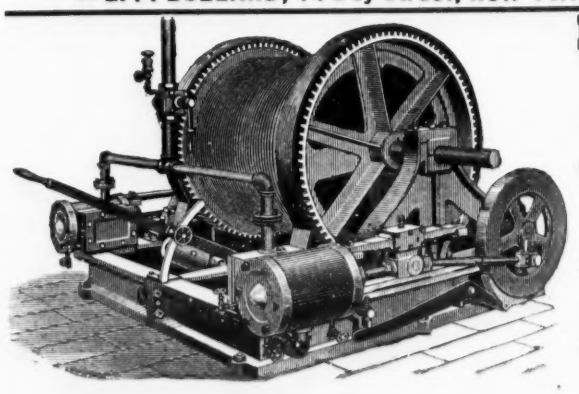
PATENT HOT POLISHED SHAFTING.

Superior to any shafting in market for the following reasons, viz.: 1st.—It is perfectly straight and round. 2d.—It can be rolled accurately to any desired gauge. 3d.—It has the beautiful blue finish of Russia Sheet Iron, rendering it less liable to rust or tarnish than shafting of the ordinary finish. 4th.—It will NOT SPRING or WARP IN KEY SEATING like most of the other manufactured shafting sold in the market, and, as a consequence, is admirably adapted for LINE AND COUNTER SHAFTING. 5th.—The surface is composed of MAGNETIC OXIDE OF IRON, forming a superior journal or bearing surface. 6th – It is made of superior stock.

Sizes made from ⅞ to 3½ inches, advancing by sixteenths. Price lists, with references and other information, furnished on application to

AKRON IRON CO., Akron, O., Sole Manuf'rs.

Or **E. P. BULLARD, 14 Dey Street, New York,** General Eastern Agent.



Improved Hoisting Engines

Specially adapted for

MINING PURPOSES.

ALL SIZES.

With Reversible Link Motion, or Patent Friction Drum.

Manufactured by the

LIDGERWOOD MF'G CO.

Offices and Salesroom: 96 Liberty Street, N. Y.

Works: Partition, Ferris, and Dikeman Streets, Brooklyn.

G. S. WORMER & SONS, Agents, Chicago, St. Louis & Detroit.

— THE —

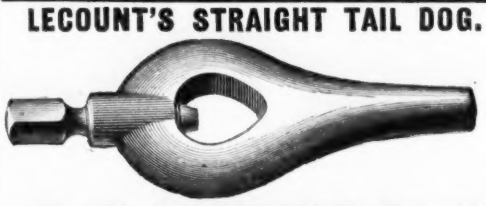
Fleetwood & Dexter SCROLL SAWS,

For all manner of cutting in wood and metal, after 10 years' use, have proved superior in all respects.

TRUMP BROS. MACHINE CO.

WILMINGTON, DELAWARE.

LECOUNT'S STRAIGHT TAIL DOG. — To be driven from a Stud in the Face Plate.

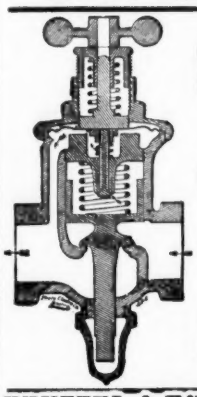


PRICES.

No. 1,	¾ in.	$ .70	No. 10,	2¼ in.,	$1.60
" 2,	⅞ "	.80	" 11,	2½ "	1.60
" 3,	1 "	.80	" 12,	3 "	1.80
" 4,	1¼ "	.95	" 13,	3½ "	2.00
" 5,	1¼ "	.95	" 14,	4 "	2.30
" 6,	1⅜ "	1.10	" 15,	4½ "	3.00
" 7,	1½ "	1.10	" 16,	5 "	3.50
" 8,	1¾ "	1.25	" 17,	5½ "	4.25
" 9,	2 "	1.40	" 18,	6 "	5.00

1 Set to 2 inches, $9.05 — Full Set, $34.10

C. W. LeCOUNT, South Norwalk, Conn.



CURTIS Pressure Regulator

For Steam, Water and Air,

MANUFACTURED BY

Curtis Regulator Co.

51 BEVERLY ST.,

Boston, - - Mass.

GENERAL AGENCIES:

109 Liberty St., New York.
925 Market St., Phila., Pa.
80 Market St., Chicago, Ill.
Cor. Holliday and Saratoga Streets, Baltimore.

FORBES & CURTIS,

Bridgeport, Conn.

M'f'r's of

FORBES' PATENT Die Stocks,

For threading and cutting off pipe without the aid of vise. Only one man required to thread 6 in. pipe.

KEUFFEL & ESSER, 127 FULTON ST. NEW YORK.

MANUFACTURERS OF THE

HELIOS BLUE PROCESS PAPER.

Prepared and Unprepared.

SOLD AT ALL STATIONERS.

Buy only **"HELIOS" PAPER,** it is the best made and Warranted to give good Copies.

WORCESTER MACHINE SCREW CO.

AND 111 LIBERTY ST NEW YORK

MANUFACTURERS OF

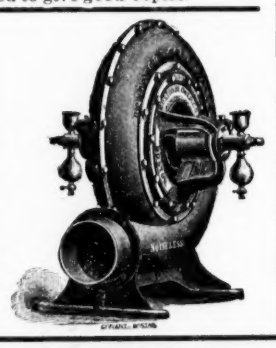
STANDARD MACHINE SCREWS.

BOSTON BLOWER CO.,

BOSTON, MASS.

Blowers and Exhausters

OF EVERY DESCRIPTION.



H.W.JOHNS' ASBESTOS

ASBESTOS ROPE PACKING,
ASBESTOS WICK PACKING,
ASBESTOS FLAT PACKING,
ASBESTOS SHEATHINGS,
ASBESTOS GASKETS,
ASBESTOS BUILDING FELT,

Made of strictly pure Asbestos.

H. W. JOHNS M'F'G CO.,

87 MAIDEN LANE, NEW YORK,

Sole Manufacturers of H. W. Johns' Genuine

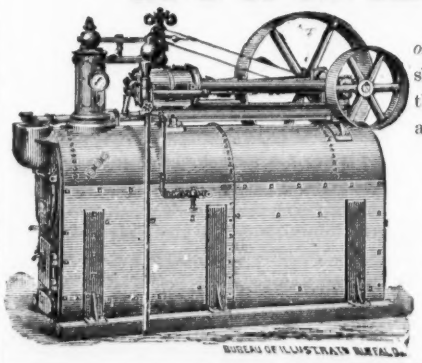
ASBESTOS LIQUID PAINTS, ROOF PAINTS, ROOFING, STEAM PIPE AND BOILER COVERINGS, FIREPROOF COATINGS, CEMENTS, ETC.

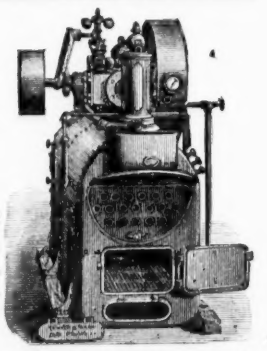
Descriptive price lists and samples free.

OUR SPECIALTY IS

Economical Powers

Of 5 to 25 H. P.





Of **1,900** in use *not one* has Exploded, or can show a rupture—due to their absolute safety and simplicity.

In finish and construction these Engines are admirable, and will compare favorably with those of higher price. Each is built on a perfect system of duplicating parts—a point of convenience to customers. Correspondence solicited, and Catalogues mailed to any address.

SKINNER & WOOD, M'f's.,

ESTABLISHED 1867. ERIE, PA.

THE BRAYTON PETROLEUM ENGINE CO.

50 Federal St.

BOSTON, MASS.

No Boiler. No Coal. No Steam. No Ashes. No extra Insurance. No Engineer. No Danger. No Explosion. No Fires. Almost no Attendance.

SAFETY! ECONOMY! CONVENIENCE!

Expense Ceases when Engine is Stopped.

While the cheapest motor in the world for continuous running, the cost of fuel becomes a mere trifle when power is required at intervals only.

J. R. SMITH.....Philadelphia, Pa.
G. S. WORMER & SONS.....Detroit, Mich.
G. S. WORMER & SONS.....Chicago, Ill.
T. S. BOWMAN.....St. Louis, Mo.
ROBINSON & CARY.....St. Paul, Minn.
} Agents.

WORTHINGTON PUMPING ENGINES AND STEAM PUMPS.

HENRY R. WORTHINGTON,

New York, Chicago,
St. Louis, Boston, S. Francisco.

THE HANCOCK INSPIRATOR

The Standard for Stationary, Marine, Locomotive

AND ALL CLASSES OF BOILERS.

Over 45,000 in Use.

Adopted by the Largest Mills and Manufactories.

Send for Circulars to

THE HANCOCK INSPIRATOR CO.

34 BEACH STREET, BOSTON.

MACHINERY

For Reducing and Pointing Wire

by compression or swaging **COLD.** Machines manufactured under patents owned by Miller, Metcalf & Parkin, Pittsburgh, Pa. For machines or information, address

S. W. GOODYEAR, Waterbury, Conn.

TOOLS.

Machinists, Engineers, Model Makers

and all classes of Mechanics can find **TOOLS** to suit them at

184 to 188 WASHINGTON STREET,
BOSTON, MASS.

A. J. WILKINSON & CO.
CATALOGUES FREE.

JOSEPH B. MATTHEWS,
AUTOMATIC ENGINES, BALTIMORE, MARYLAND.

FIFTEEN YEARS' RECORD
HARRISON SAFETY BOILERS

SOUTH MANCHESTER, CT., April 7th, 1883.

HARRISON BOILER WORKS, Philadelphia, Pa.

Gentlemen:—In reply to your favor to our Mr. Frank Cheney (who is now absent in Florida,) making inquiry of our experience with the HARRISON BOILER, will say that, we have eighteen of them comprising 1200-horse power in our works, some of which have been in constant use over fifteen years, and apparently in as good condition and working as well to-day as when first erected.

We have always found them very economical in fuel, and when constructed of good material very economical in repairs, quick generators, producing large quantity of very dry steam, easy in care, easily and readily cleaned and repaired, and adding their entire safety from explosions, we consider them among the best, if not the best Boiler in market. Yours very truly,

CHENEY BROS.,
By C. S. Cheney.

Descriptive catalogues, drawings and estimates promptly furnished.

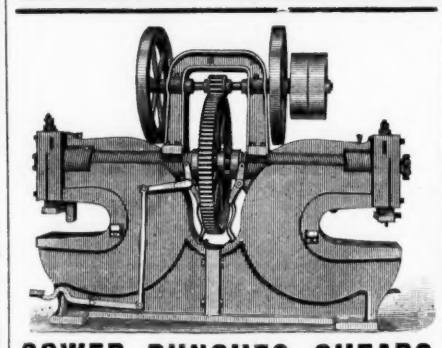
HARRISON SAFETY BOILER WORKS, Germantown Junction, Philadelphia, Pa.

FRICTION CLUTCH PULLEYS AND CUT-OFF COUPLINGS,

JAS. HUNTER & SON, North Adams, Mass.

MECHANICAL WORK A SPECIALTY

D. H. TUTTLE
ENGRAVER ON WOOD
21 BEEKMAN ST. N.Y.



POWER PUNCHES, SHEARS, HAMMERS.

We make over 100 sizes of Punches and Shears, Double and Single, varying from 500 to 35,000 pounds in weight, and adapted for every variety of work The Double machines are equal to two Single ones as each side is worked independently. Also

ADJUSTABLE HELVE CUSHIONED HAMMERS

Of all sizes, unequalled for efficiency and durability.

The Long & Allstatter Co.,
HAMILTON, OHIO.

UPRIGHT DRILLS.

Balanced Spindle, Quick Return.

Drills to center of 11 inches.

PRICE, - - $55.00.

LODGE, BARKER & CO.
(AGENTS.)
189 W. Pearl St., Cincinnati, O.

VOLNEY W. MASON & CO.
Friction Pulleys, Clutches and Elevators
PROVIDENCE, R. I.

TAPS & DIES · VISES · TWIST DRILLS · CHUCKS · MACHINE SCREWS · LATHES · FILES · STEEL & STOCK STUBS

TOOLS

TOOLS for Machinists, Amateurs, Jewellers, Model Makers, Blacksmiths, Carpenters, Coachmakers, etc.
Send 20 cts. for new Metal Worker's Catalogue, 300 Pages. Wood Worker's Catalogue free.
TALLMAN & McFADDEN, Philadelphia, Pa.

THE

GARDNER

COMPENSATION

GOVERNOR

OVER 27,000 IN USE.

Unequaled for Accuracy, Safety, Convenience, Durability, Workmanship, and Design. Address,

The Gardner Governor Co.,
QUINCY, ILL.

NEW YORK AGENTS. JAMES BEGGS & CO., No. 9 DEY ST.

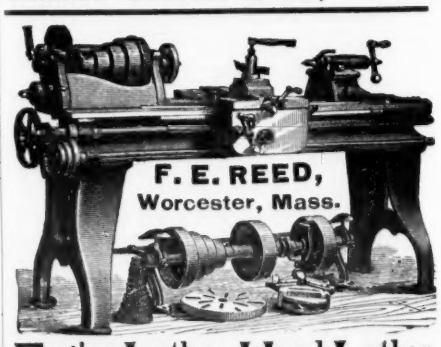
CUTTING-OFF MACHINES,

4½ in. and 2½ in.

CENTERING MACHINES,

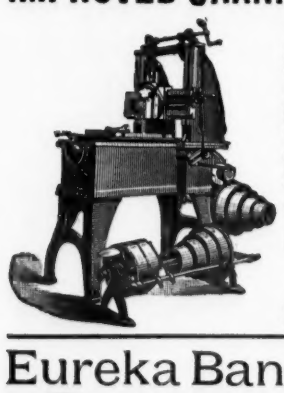
4½ in. and 2 in.

WARREN HASKELL & CO., Boston, Mass.



Engine Lathes, Hand Lathes,

SLIDE RESTS and PLANER CENTERS.



IMPROVED CRANK PLANER

Planes 16 inches high and wide, and has 12 inch stroke. It has power, cross and angular down feed as shown in cut, or cross feed only, if desired.

Also, quick return motion and screw running whole length under bed.

It is self-oiling in its ways.

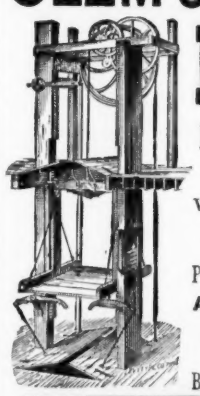
R. A. BELDEN & CO.
Danbury, Conn.

THE Slate Sensitive Drill.

Adapted to rapid work with small drills. Its extreme sensitiveness prevents clogging and breakage of drills. Has a swinging table with attachment for center drilling. Instantly adjustable to different lengths of work. Over 200 already in use. Send for circular.

DWIGHT SLATE,
HARTFORD, CONN.

CLEM & MORSE ELEVATORS



Hydraulic, Steam, Belt, and Hand Power,

With most approved Safety Devices such as

AUTOMATIC HATCH DOORS, PNEUMATIC SAFETY CLUTCH, &c.

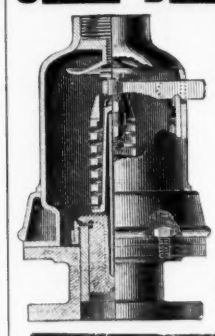
ALBRO-HINDLEY SCREW GEARING.

411 & 413 CHERRY ST., Phila.

Branch Office, 108 Liberty St. N. Y.

UNION BRASS MFG. CO.

CHICAGO, ILL.

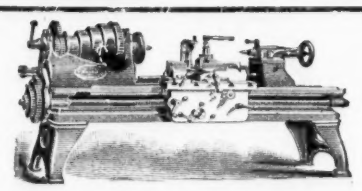


Manufacturers of

Orme's Patent
LOCOMOTIVE
MARINE
RELIEF
LOCK-UP
SAFETY VALVES.

These Valves have been approved by U. S. Government.

N. Y. Office, 115 Broadway.



NEW HAVEN MANFG. CO.,

New Haven, Conn.

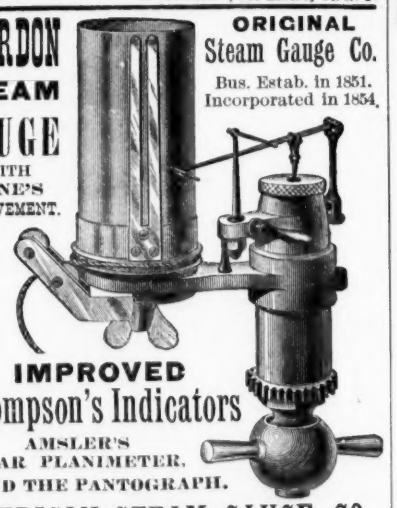
IRON-WORKING MACHINERY,

Planers, Shapers, Drills, Slotters, &c.

BOURDON STEAM GAUGE

WITH LANE'S IMPROVEMENT.

ORIGINAL
Steam Gauge Co.
Bus. Estab. in 1851.
Incorporated in 1854.



IMPROVED
Thompson's Indicators

AMSLER'S POLAR PLANIMETER, AND THE PANTOGRAPH.

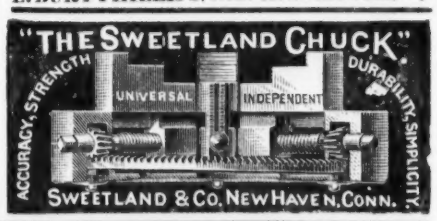
AMERICAN STEAM GAUGE CO.,

Sole Manufacturers,

36 Chardon Street, Boston, Mass.

Send for New Illustrated Price List and name this paper.

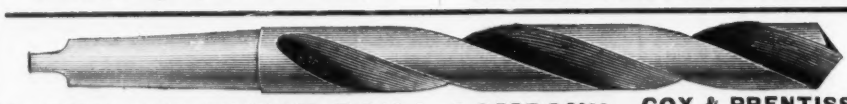
J. C. BLAISDELL, Pres.
E. BURT PHILLIPS, Treas. H. K. MOORE, Sup't



Eureka Band Saw

We build three sizes at prices lower than an equally good Band Saw can be had elsewhere. For further information inquire of

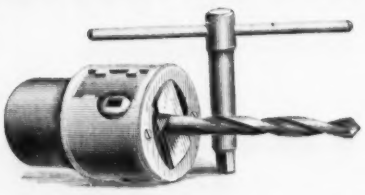
FRANK & CO.,
176 Terrace Street,
BUFFALO, N. Y.



CLEVELAND TWIST DRILL COMPANY,

COX & PRENTISS,
24 & 26 West St., Cleveland, O.
101 Chambers St., New York.

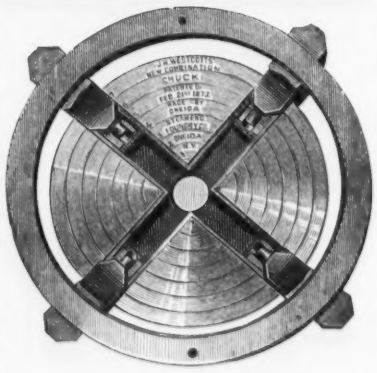
WESTCOTT'S LATHE & DRILL CHUCKS



Send for Price List.

Little Giant "Improved."

ONEIDA STEAM ENGINE & FOUNDRY CO.
ONEIDA, N. Y.



SCHUTTE & GOEHRING, Manufacturers

KORTING DOUBLE TUBE INJECTOR,

THE LEADING BOILER FEEDER.

OPERATED BY ONE HANDLE.

Will Lift Hot Water through Hot Suction Pipe. Guaranteed to Work under all conditions.

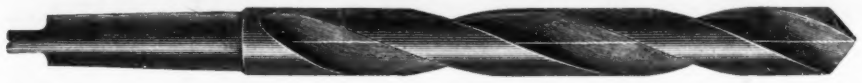
SEND FOR CIRCULAR.

OFFICES AND WAREROOMS:

12th and Thompson Streets, Philadelphia.
JARVIS ENGINEERING CO., 7 Oliver St., Boston.
POND ENGINEERING CO., 709 Market St., St. Louis.
C. E. KENNEDY, 1438 Blake St., Denver Col.
G. R. LOMBARD & CO., 1026 Fenwick St., Augusta, Ga.
A. ALLER, 109 Liberty St., New York.
GEORGE A. SMITH, 1419 Main St., Richmond, Va.
H. P. GREGORY & CO., 2 California St., San Fran'co.
PHILIP BUCHNER, 325 Robert St., St. Paul, Minn.

MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD, MASS.

Sole Manufacturers of Morse Patent Straight-Lip Increase Twist Drill.



SOLID AND SHELL REAMERS, BEACH'S PATENT SELF-CENTERING CHUCK, BIT STOCK DRILLS.

Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Drill Grinding Machines, Center and Adjustable Drill Chucks, Taper Reamers, Milling Cutters, and Special Tools to order.

All Tools Exact to Whitworth Standard Gauges.

GEO. R. STETSON, Sup't. EDWARD S. TABER, Pres't and Treas.

A fire-proof non-conductor and deafener. 24 cents per cubic ft. at wholesale prices. Sample and circulars free by mail.

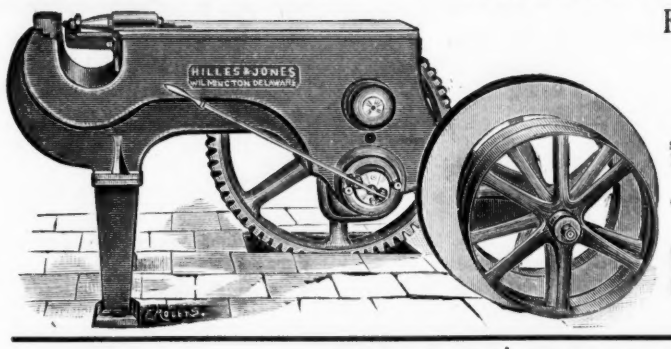
U. S. Mineral Wool Co.,

22 Cortlandt Street, N. Y.

MINERAL WOOL.

Fibre Magnified.

HORIZONTAL FLANGE PUNCH,



For Boiler Makers'

AND

Iron Ship Builders'

USE.

Punches Flanges of all shapes, and Bent Angle Iron from either side.

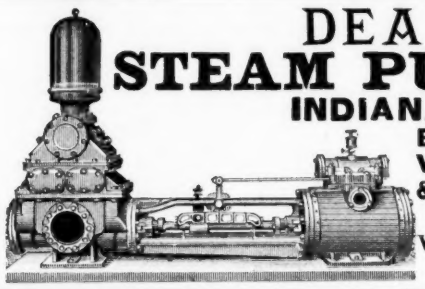
FIVE SIZES. Depth of jaws from 6" to 42".

MADE BY

HILLES & JONES,

WILMINGTON, DEL.

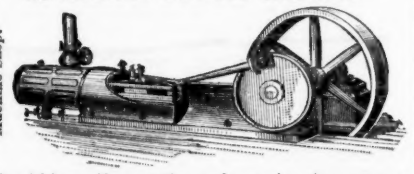
DEAN BROS'
STEAM PUMP WORKS,
INDIANAPOLIS, IND.



Boiler Feeders, Fire Pumps, Vertical Pumps, Air Pumps & Condensers, Water Works Pumps.

WRITE FOR CATALOGUE & PRICES.

AUTOMATIC CUT-OFF ENGINES.



Corning Foundry and Machine Shop.

Furnishing uniform motion under varying circumstances and particularly adapted to Electric Lighting Machinery, Grist Mills, Cotton Mills, etc., developing the greatest amount of power from as small an amount of fuel and water as any non-condensing engine made. Send for our circular "c c," of high-grade engines. Established in 1840. Box 1230. B. W. PAYNE & SONS, Corning, N. Y.

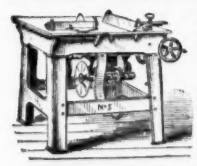
Patent Lathe Chucks, Best & Cheapest

Hold from 1 in. to 20 ft. diam. In use 15 years, and good for 20, on roughest, dirtiest work.

Sent on trial by

American Twist Drill Co.,

MEREDITH, N. H., Sole Manufacturers.



Wardwell's Patent Saw Bench, Band Saws, Rotary and Stationary Bed Planers, and Buzz Planers, Dowel Machines, Waymouth Lathes, Gauge Lathes.

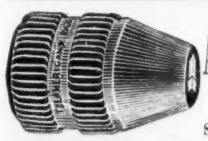
Also, a large stock of Second-hand Machinery, consisting of Machinists' Tools, Woodworking Machinery, and Engines and Boilers. Send for Illustrated Catalogue with stamp.

ROLLSTONE MACHINE CO.,

45 WATER STREET, FITCHBURG, MASS.

THE

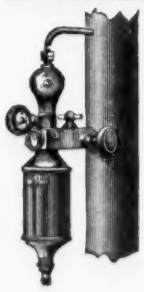
American Drill Chuck



Is the cheapest 3-parallel Jaw Chuck. Price, $4.

Sold by all Tool Dealers.

BREHMER BROS., 440 North 12th Street, Philadelphia, Pa.



SWIFT'S AUTOMATIC

LUBRICATOR

FOR STEAM ENGINES.

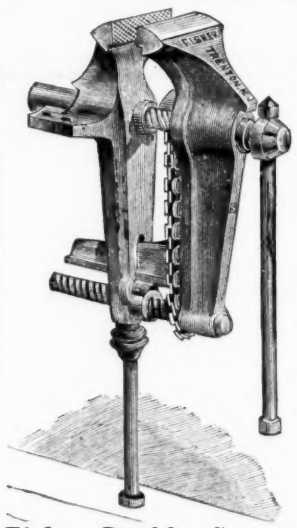
POSITIVE FEED,

FLASH "SIGHT."

NO EXTERNAL OR INTERNAL PIPES,

NO GLASS TUBES, OR LOOSE JOINTS.

ALLEN W. SWIFT, Elmira, N. Y.



D. SAUNDERS' SONS

MANUFACTURERS OF THE ORIGINAL

Trade **I.X.L.** Mark.

Pipe Cutting and Threading Machine.

BEWARE OF IMITATIONS.

None Genuine without our Trade-Mark and Name.

STEAM AND GAS FITTERS' HAND TOOLS, PIPE CUTTING & THREADING MACHINES

For Pipe Mill use a Specialty.

Send for Circulars. **YONKERS, N. Y.**

E. G. FELTHOUSEN, BUFFALO, N. Y.

Manufacturer of

Cylinder Oil Pumps,

RATCHET DRILLS, GAUGE COCKS, FLUE CLEANERS, &c.

Each Gauge Cock has four inches of Jenkins' Packing. One packing will last several years.

C. M. MORSE, Eastern Agent,

Office, 12 CORTLANDT ST., NEW YORK

THE DUPLEX INJECTOR,

THE BEST BOILER FEEDER KNOWN.

Not liable to get out of order. Will lift water 25 feet. Always delivers water *hot* to the boiler Will start when it is hot. Will feed water through a heater. Manufactured and for sale by

JAMES JENKS, Detroit, Mich.

CHARLES MURRAY
ENGRAVER ON WOOD
58 ANN ST. NEW YORK.

SPECIAL NOTICE.

In press and ready for distribution in Thirty Days.

A Pocket Manual for Engineers.

Edited by JOHN W. HILL, Mechanical Engineer,

Mem. Am. Soc'y of Civil Engineers; Mem. Am. Ass'n R. R. M. M.

EDITION, TEN THOUSAND.

Of which, first 2,000 copies will be furnished postage pre-paid at one dollar ($1.00) each, subsequent copies will be furnished (postage pre-paid) at one dollar and a-half ($1.50) each.

A pocket manual of useful information for Mechanical Engineers, Steam users and mechanics; containing 224 pages (not in Nonpareil type) of carefully selected data, formula and experimental investigations, from the latest and most approved sources. Printed from electrotype plates, on white No 1 book paper, in stiff morocco covers with cardinal edges; size of page, 4 ½ x 6¾ inches. From press of Robert Clarke & Co, Cincinnati.

Published by WILLIAM A. HARRIS,

Builder of HARRIS-CORLISS STEAM ENGINES,

PROVIDENCE, R. I.

To whom all Subscriptions for copies should be sent.

THE ALLIGATOR WRENCH,

Teeth cut diagonally. Grips Round Iron or Pipe.

Patented August 31, 1875.

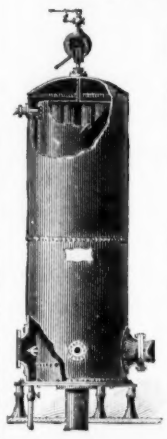
AMERICAN SAW CO., Trenton, N. J.

STEWART'S READY ROOFING

For STEEP and FLAT ROOFS of all kinds; can be applied by ordinary workmen at ONE THIRD the cost of TIN. Send for a sample and our circular which gives full directions how to apply your own roof; also how to repair leaky roofs of all kinds. Address,

W. H. STEWART,
74 Cortlandt St., New York.

THE BARAGWANATH STEAM JACKET FEED WATER HEATER & PURIFIER.



Manufactured by the

Pacific Boiler Works
OF CHICAGO.

Best Feed Water Heater

IN THE WORLD.

Delivers Feed Water several degrees above boiling point.

REDUCES BACK PRESSURE ON ENGINE.

Prevents and removes Scale and incrustation from Boilers.

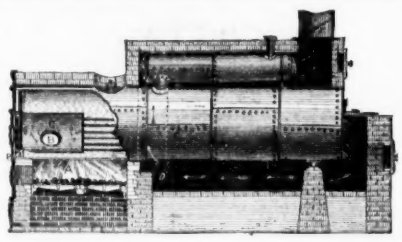
SAVES FUEL.

Increases the steaming capacity of boilers, and saves boiler repairs.

BENJ. F. KELLEY,

91 Liberty St., New York.

Gen. Eastern Agent.



BRIDGEPORT BOILER WORKS,

BRIDGEPORT, CONN.

LOWE & WATSON, Proprietors,

MANUFACTURERS OF

The Lowe Patent Tubular Boiler, with and without Superheating Drums. Fourteen years' use proves them the most durable and reliable boiler known. Gives dry steam. The process for combustion of the gases is in the construction and setting. Burns any fuel; obtains as much result from it as any boiler or setting with no more cost, and greater durability.

Send for descriptive Circular.

THOMPSON & HOLMES

CHUCKS

TRADE MARK

MAKERS OF ALL KINDS & SIZES.

Send for Catalogue to

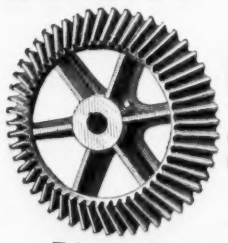
JAMES D. FOOT, Sole Agent,

No. 101 CHAMBERS STREET, NEW YORK.

MACHINE MOULDED

Spur and Bevel

GEARS



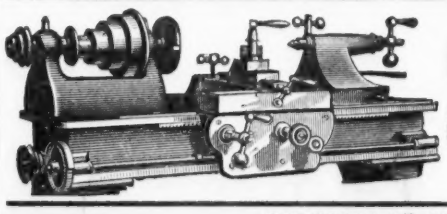
Pulley Castings, &c.

Special Inducements to the Trade.

List mailed on application.

POOLE & HUNT,

Baltimore, Md.



BIRKENHEAD'S New Single Head Lathes.

Hollow Spindle, Improved Stop Motion, 14 inch Swing 4 to 8 feet beds. Also, 5 foot **Hand Lathes**, and **Engine Lathes** with screws and back gears, or back geared lathes without screw. Send for circular.

JOHN BIRKENHEAD,

MANSFIELD, MASS., U. S. A.

IMPORTERS OF JONAS & COLVER'S

FINE TOOL STEEL,

FOR CUTTERS, MILLS, TAPS, REAMERS, AND ALL

FINE TOOLS.

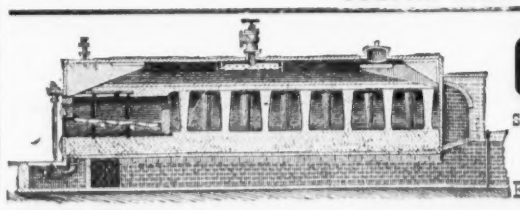
SEND FOR STOCK AND PRICE LIST TO

PRATT & CANDEE, Hartford, Conn.

STEAM AND DROP PILE DRIVERS.

Skinner's Patent Steam Pile Hammer, automatic; very effective; simple and durable, with recent improvements.

VULCAN IRON WORKS, CHICACO, ILLINOIS.



THE

Galloway Boiler.

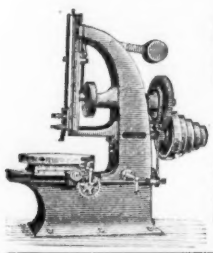
Safety—Economy in Fuel—Low Cost of Maintenance—Dry Steam without Superheating.

Correspondence solicited. Address,

Edgemoor Iron Co., Wilmington, Del.

WILLIAM SELLERS & CO.

PHILADELPHIA, PA.

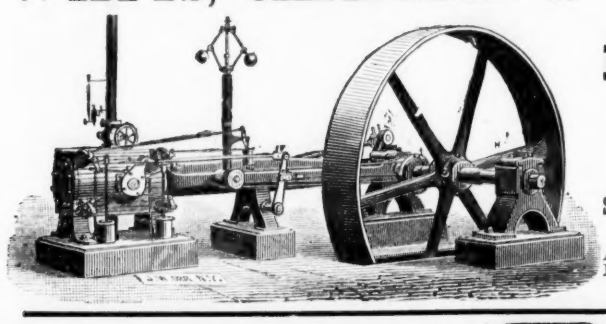


Machine Shop and Railway EQUIPMENTS.

Shafts, Couplings, Hangers, Pulleys, Mill Gearing, etc., Lathes, Planers, Drills, Shapers, Bolt Cutters, Twedell's Hydraulic Riveters, etc. Railway Turntables and Pivot Bridges, Gifford Injectors, Seller's Improvements. New Patterns. Simple, Effective.

New York Office, No. 79 Liberty Street.

WATTS, CAMPBELL & CO., NEWARK, N. J.



MANUFACTURERS OF

Improved Corliss STEAM ENGINES

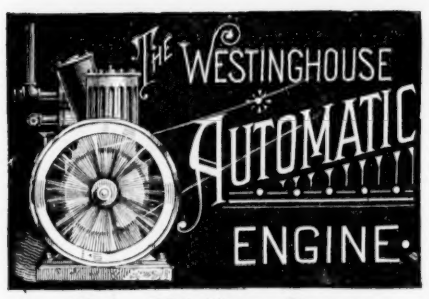
In Full Variety.

Sizes varying from 30 to 2000 H. P.

Horizontal or Vertical, Direct Acting or Beam, Condensing, Non-Condensing or Compound.

Send for Circular.

THE WESTINGHOUSE AUTOMATIC ENGINE.



30 to 300 Horse Power.

Send for Illustrated Circular and Reference List.

STATE THE HORSE POWER REQUIRED, AND

ASK OUR PRICES!

Especially adapted to Direct Connection to Shafting and Machinery.

THE WESTINGHOUSE MACHINE CO.,

PITTSBURCH, PA.

Address, if more convenient, our Branch Offices: 94 Liberty St., NEW YORK. 14 South Canal St., CHICAGO. 401 Elm St., DALLAS, TEXAS.

PECK'S PAT. DROP PRESS

BLAST FORGES

STEEL & IRON DROP FORGINGS

Drop Dies and Special Machinery.

BEECHER & PECK, NEW HAVEN CONN.

THE SEIBERT CYLINDER OIL CUP CO.,

53 Oliver St., Boston. N. Y. Office, 26 Vesey St.

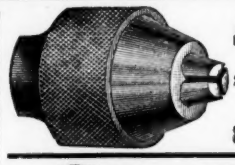
Sole Manufacturers of **Oil Cups for Locomotives, Marine and Stationary Engine Cylinders,** under the Seibert & Gates Patents, with Sight Feed.

TAKE NOTICE.

The "Sight Feed" is owned exclusively by this company. See Judge Lowell's decision in the United States Circuit Court, District of Massachusetts, Feb. 23, '82.

All parties are hereby notified to desist the use, manufacture, or sale of same, as we shall vigorously pursue and prosecute all infringers.

[illegible] Gears and G. Cutting [illegible] Grant, [illegible] den St., Boston. [illegible] Gear Book Free. [illegible] WATER MOTORS.

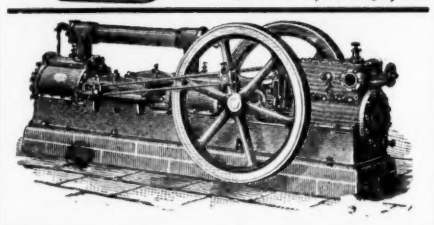


Almond Drill Chuck.

Sold at all Machinists' Supply Stores.

T. R. ALMOND,

84 Pearl St., Brooklyn, N.Y.

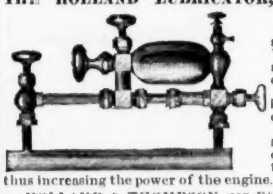


STEAM PUMPS, AIR COMPRESSORS, Friction Hoisting Engines, Vacuum Pumps and Condensers, General Machinery, Steam Engines. Capacity to bore cylinders 110 in. diameter and turn Fly Wheels of 24 feet.

The Norwalk Iron Works Co.,

SOUTH NORWALK CONN.

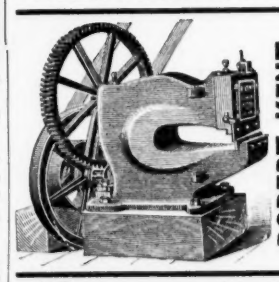
THE HOLLAND LUBRICATOR, VISIBLE DROP,



Is guaranteed to be

1. A perfect insurance against the cutting of Valve-seats, Cylinder and Governor Valves of the engine.
2. It will pay for itself in 6 months in saving of oil, coal, and packing.
3. It will insure more speed in the revolutions of the engine, say from 1 to 2 strokes per minute, thus increasing the power of the engine. Manufactured by

HOLLAND & THOMPSON, 217 River St., Troy, N. Y.



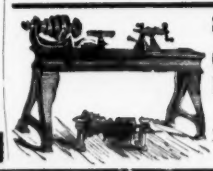
ROBERT KENT,

45 to 49 IAY ST., BROOKLYN, N. Y.

Manufacturers of

Punching, Shearing, and Riveting Machines

Also, Plate Bending Rolls.



Superior 10, 12 & 16 in.

Speed Lathes

Built by

FAY & SCOTT, Dexter, Me.

Send for Description.

For Superiority in Drilling Soft or Hard, Thin or Thick Metals use the PATENT FLUTED DRILL.

For Lathe Work it is unexcelled. In boring, counterboring, reaming, or to countersink, the highest testimonials are given. Made by **UNION TWIST DRILL CO.,**

96½ SUMMER STREET, BOSTON, MASS., Agents for

Gage's Self-Tightening Drill Chuck.

S. A. SMITH, Agent for the West, 154 LAKE ST., CHICAGO, ILLS.

Holds from 0 to ⅛ and 0 to ¾.

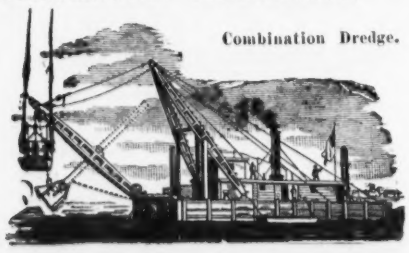
No Key or Wrench required.

DREDGES

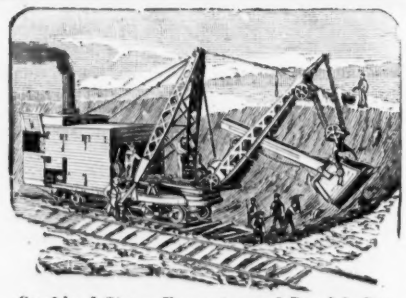
guaranteed to excavate 50 per cent. more material from hard bottom than any other machine.

EXCAVATOR

has a capacity of 6 cubic yards per minute in gravel. Very efficient and durable in the hardest hard-pan. Derrick lifts 8 tons. Circulars furnished.



Combination Dredge.



Combined Steam Excavator and Derrick Car.

OSGOOD & MACNAUGHTON,

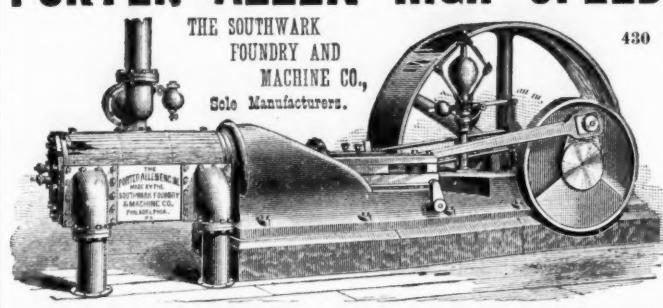
ALBANY, N. Y., Patentees,

Successors to RALPH R. OSGOOD, Troy, N. Y.

PORTER-ALLEN HIGH SPEED ENGINE.

THE SOUTHWARK FOUNDRY AND MACHINE CO., Sole Manufacturers.

430 WASHINGTON AVENUE, PHILADELPHIA.



The UNITED STATES GOVERNMENT has selected for the Post Office in Philadelphia Two 200 H. P. Porter-Allen Engines, which are now being built, and will soon be erected.

The NEW HAVEN WIRE CO., New Haven Ct., have ordered Two 300 H. P. Porter-Allen Engines for the new factory which they are building.

The CAMBRIA IRON CO., Johnstown, Pa., will soon put at work their *eleventh* Porter-Allen Engine. All the others are doing excellent work. The first Porter-Allen plant put in these works, six years ago, for rolling mill purposes, with same boilers and engines relatively equivalent to the former, doubled the output of the Works.

A handsomely illustrated new work on High Speed Engines has been issued by us for *free distribution* among engineers and manufacturers. It has excited such an interest among scientific men and engineers as to call for another edition.

P. BLAISDELL & CO.,

Manufacturers of

Machinists' Tools,

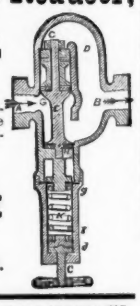
WORCESTER, MASS.

Ross Fluid Pressure Reducer,

FOR

Steam, Water, Air and Gas.

Automatically reduces the pressure in pipes to any desired extent.



ROSS VALVE CO.

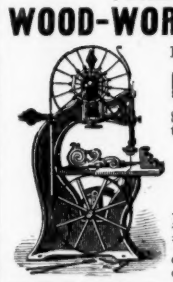
652 RIVER ST.

TROY, N. Y.

J. A. FAY & CO., CINCINNATI, Ohio, U. S. A.

BUILDERS OF IMPROVED

WOOD-WORKING MACHINERY



Embraces nearly 400 Machines for

Planing & Matching,

Surfacing, Moulding, Tenoning, Mortising, Boring, and Shaping, &c.

Variety and Universal

WOOD WORKERS.

Band, Scroll and Circular Saws, Resawing Machines, Spoke and Wheel Machinery, Shafting, Pulleys, etc. All of the highest standard of excellence.

W. H. DOANE, Pres't. D. L. LYON, Sec'y.

Fox, Turret and Speed Lathes

—AND—

Swivel Head Engine Lathes,

(18 and 26 in. from new patterns.)

GEORGE GAGE, WATERFORD, N. Y.

Address, TAYLOR MFG. CO., Chambersburg, Pa.

(Please Mention this Paper.)

THE NEW PULSOMETER,

The cheapest, strongest, most simple, compact, durable, effective and economical Steam Pump in the market, for raising liquids under and up to 100 feet. No Machinery, No Oil, No Special Care. Can be worked suspended by a chain. Will pass grit, mud, sand, pulp, etc., without injury to its parts. Needs only a steam pipe from boiler to run it. Price, 600 gallons per hour, $50; 1,200 do. $75; 3,600 do. $100; 6,000 do. $150; 10,000 do. $175; 18,000 do. $225; 25,000 do. $275; 45,000 do. $400; 60,000 do. $500; 120,000 do. $1,000. Write for illustrated descriptive book with testimonials, etc. Mailed free. Pulsometer Steam Pump Co., 83 John St., New York.

Wm. B. Bement & Son,

PHILADELPHIA, PA.

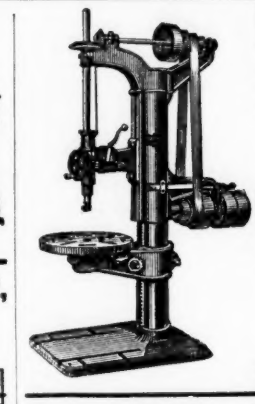
MANUFACTURERS OF

METAL WORKING MACHINE TOOLS

of all descriptions and a great number of sizes, including

STEAM HAMMERS,

Steam and Hydraulic Riveters, Cranes, Punches and Shears, Bending Rolls, Plate Planers, &c.



UPRIGHT DRILLS

16 to 60 Inches Swing.

BORING AND TURNING MILLS

To Swing, 48, 66 & 84 in.

H. BICKFORD,

Cincinnati, Ohio.

THE HENDEY MACHINE CO.

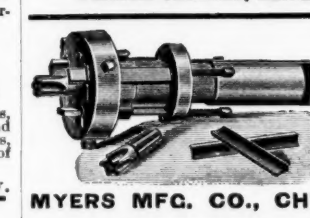
TORRINGTON, CONN.

15, 24 and 30 in. Shapers.

4 ft. x 16 in., 5 ft. x 20 in., 6 ft. x 24 in., 6 ft. x 26 in., 8 ft. x 26 in. and 8, 10, and 12 ft. x 30 in. Planers.

5 ft. x 12 in., 6 ft. x 12 in., 6 ft. x 15 in. and 8 ft. x 15 in. Hollow Spindle Hand Lathes.

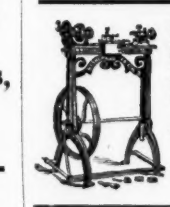
AMATEURS' HAND PLANERS, SHAPER AND PLANER CENTERS, SLIDE RESTS, &c.



JEWEL FLUE HOLE CUTTERS.

With Renewable Cutters. Kept sharp by grinding on end.

MYERS MFG. CO., CHICAGO, ILL.



SHEPARD'S CELEBRATED $60 Screw Cutting Foot Lathe.

Foot and Power Lathes, Drill Presses, Scrolls, Saw Attachments, Chucks, Mandrels, Twist Drills, Dogs, Calipers. Send for catalogue of outfits for amateurs or artisans. Address,

H. L. SHEPARD & CO.,

341 & 343 WEST FRONT STREET, CINCINNATI, OHIO.

—A—

New Drill Press.

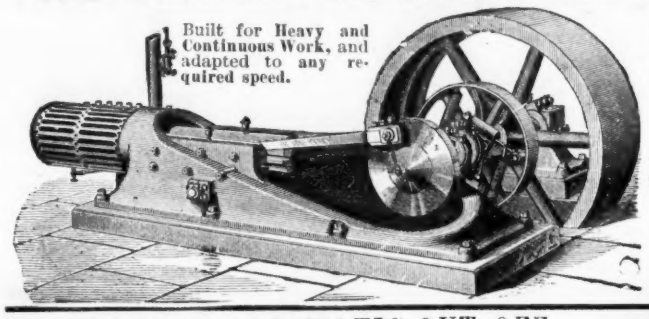
Sensitive enough for the smallest drills, powerful enough to bore a ¼ in. hole, and so handy that it brings joy into the worst machine shop. **Sterling Elliott,**

Newton, Mass.

ALSO,

Elliott's Cutting-Off Tool

THE HARTFORD AUTOMATIC CUT-OFF ENGINE.



Built for Heavy and Continuous Work, and adapted to any required speed.

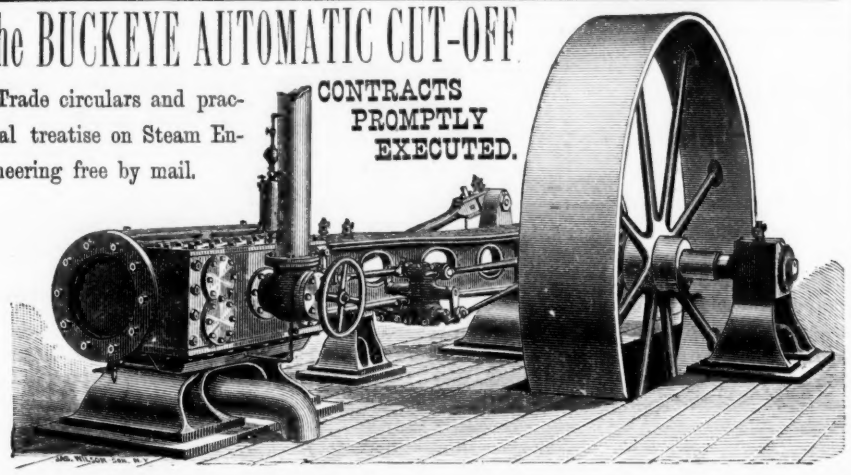
Close regulation and best attainable Economy of Fuel. Circular and Practical Treatise on Steam Engineering sent on application.

THE HARTFORD ENGINEERING COMPANY,
HARTFORD, CONN.
New York Office,
Rooms 72 and 73, Astor House.

The BUCKEYE AUTOMATIC CUT-OFF

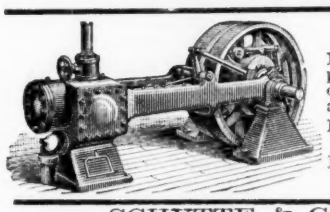
Trade circulars and practical treatise on Steam Engineering free by mail.

CONTRACTS PROMPTLY EXECUTED.



These Engines are carefully constructed for heavy and continuous duty, at medium or high rotative speeds. Highest attainable economy in consumption of steam, and superior regulation guaranteed.

Address, BUCKEYE ENGINE CO., Salem. Ohio.



STRAIGHT LINE AUTOMATIC CUT-OFF ENGINE;

Medium or high speed; uniform at all ranges of power or steam pressure; the fewest parts and working joints; the best material correctly distributed, and unexcelled in workmanship, balance, and smooth running.

For Eastern and Southern States, apply to the
Straight Line Engine Co., Syracuse, N. Y.
For the West and South-West, to the
M. C. Bullock Manufacturing Co., Chicago, Ill.

SCHUTTE & GOEHRING, Manufacturers.

THE KORTING CONDENSER.

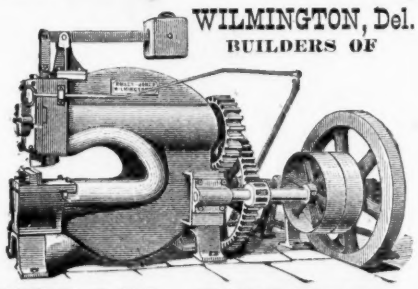
EXHAUST-STEAM-INDUCTION
Always Reliable. Send for Circular.

Will lift water without any pump. Operates equally well when supply flows to condenser from one foot fall or more. Requires no hot well, no elevated tail pipe, or tank. The most satisfactory results obtained.

OFFICES AND WAREROOMS:
12th & Thompson Sts. Phila. | A. Aller, 109 Liberty St. N.Y. | Jarvis Eng. Co., 7 Oliver St. Boston.

The Pusey & Jones Co.,

WILMINGTON, Del.
BUILDERS OF



STEAM ENGINES,

Boilers, Tanks, Machinery for Rolling Mills, Punches, Shears, Riveters, Angle Iron Cutters, Cranes, and heavy Iron Work generally.

SECOND-HAND MACHINERY,

CHEAP.

12 in. x 4 ft. Bolt Lathe. Bement & Dougherty.
13 in. x 6 ft. Engine Lathe. Watts, Campbell & Co.
13 in. x 4 ft. " " Pratt & Whitney.
15 in. x 5 ft. " " " "
15 in. x 8 ft. " " " "
15 in. x 8 ft. " " Fitchburg Machine Co.
17 in. x 8 ft. " " Lincoln.
18 in. x 8 ft. " " Lathe & Morse.
18 in. x 8 ft. " " Blaisdell.
22 in. x 10¾ ft. " " Lincoln.
16 in. x 16 in. x 3 ft. Planer. Hendey. Good order.
12 in. Crank Planer. Belden.
6 in. Shaper. Gould.

Also, NEW ENGINE LATHES.
13, 16, 20, 24, 42 inch. Ames.
16 in. x 6, 7, 8, 10 and 12 ft. Bridgeport.
24 in. x 36 in. Fifield.

DRILLS
16, 20, 22, 26, 30 in. x 36 in. Prentiss. New.
Slate Sensitive. "
Pratt & Whitney, No. 0 and No. 2 Gang. "
42 in. Radial Drill Box. "

PLANERS.
16 in. x 16 in. x 42 in. Bridgeport. New.
22 in. x 22 in. x 5 ft. Ames. "
24 in. x 27 in. x 6, 7 and 8 ft. "
26 in. x 7 ft. Breitel "
9 in. Hewes & Phillips' Shapers. "
15 in. x 24 in. Hendey Shapers. "
10, 15, 20 and 25 in. Gould & Eberhardt Shapers. "
No. 2 Lincoln Pattern Milling Machine. Ames. New.
No. 2 Screw Machine, wire feed. Secor. New.
No. 1 Square Arbor Fox Lathe. Am. T. & M. Co.
No. 2 Cabinet Turret " "

New York Agent,
Brown & Sharpe Manufacturing Co.
Bradley Hammers.
Write full particulars of what is wanted.

E. P. BULLARD, 14 DEY ST., N.Y.

Hewes & Phillips' Iron Works,

Newark, N.J.

Manufacturers of
Planers, Lathes, Gear Cutters, Shapers, Slotters,
ALSO
Hydraulic Oil Presses & Veneer Cutting Machinery, Shafting & Gearing.
Heavy Planers a Specialty.

The Allen PATENT
High Speed Engine,

Both Condensing and Non-Condensing. High economic duty and fine regulation guaranteed. Tubular Boilers and Steam Fittings.

The Craig Double Sight Feed Lubricator Co

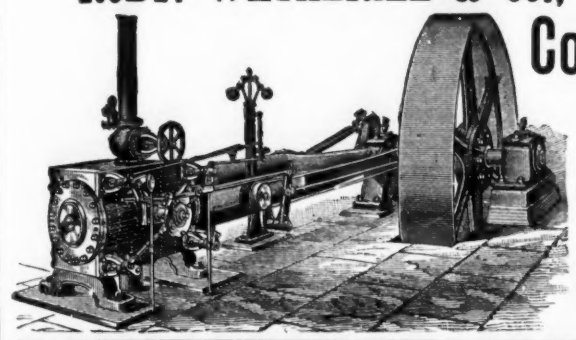
LAWRENCE, MASS.
MANUFACTURERS OF THE
CRAIG DOUBLE SIGHT FEED LUBRICATOR.

The Cheapest, Simplest and Most Complete Lubricator on the market.

SHOWS THE OIL GOING UP AND THE WATER COMING DOWN.

Send for Circular and Prices

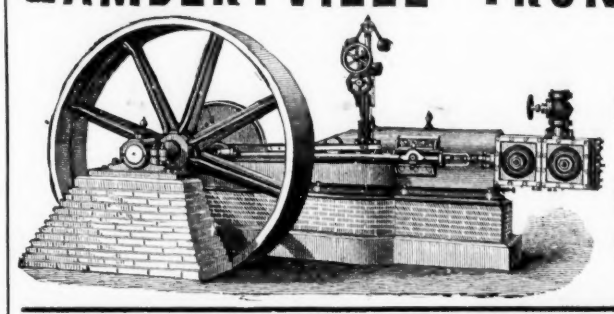
ROBT. WETHERILL & CO., CHESTER, PA.



Corliss Engine Builders,

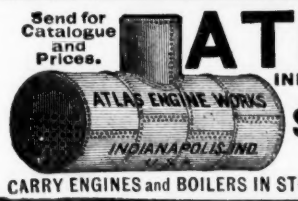
Condensing, Non-condensing, and Compound.
HIGHEST EFFICIENCY AND GREATEST ECONOMY.
Boiler Makers.
Hydraulic Riveting.

LAMBERTVILLE IRON WORKS.



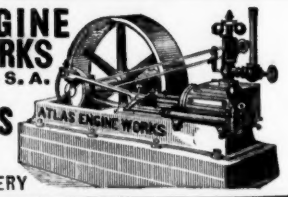
A. WELCH,
Manufacturer of
Patent Automatic
CUT-OFF
Steam Engines
Lambertville, N. J.

Send for Catalogue and Prices.



ATLAS ENGINE WORKS

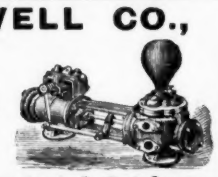
INDIANAPOLIS, IND., U. S. A.
MANUFACTURERS OF
STEAM ENGINES AND BOILERS.



CARRY ENGINES and BOILERS IN STOCK for IMMEDIATE DELIVERY

THE GORDON & MAXWELL CO.,

HAMILTON, OHIO, U. S. A.
MANUFACTURERS OF
New and Improved Style of Boiler Feeders, Steam Pumps,
—AND—
PUMPING MACHINERY,
FOR ALL SPECIAL AND GENERAL PURPOSES.
"THE BEST MADE." Send for New Illustrated Catalogue.



New & Second-Hand Machinery.

AUG 15, 1883.

1 each, Engine Lathes, 16 x 6 & 8 ft. Fair Order.
1 Engine Lathe, 14 in. x 6,7 & 8 ft. Grant & Bogert.
1 each " " 26 in. x 9, 12 & 14 ft. Grant & Bogert.
1 " " 45 in. x 15 ft. Good Order. [New
1 " " 36 in. any length of bed.
1 " " 15 in. x 6 ft. New
1 " " 14 in. x 5 & 6ft. "
1 " " 16 in. x6, 7 & 8 ft. "
1 " " 18 in. x8 & 10 ft. Lodge & Barker"
1 each Engine Lathes, 20 in. x 10 and 12 ft,
1 " " 24 in. x 10 ft. New.
1 " " 28 in. x 18 ft. New.
1 " " 24 in. x 12, 14 and 16 ft. New.
1 " " 11 in. x 4 ft. & 5 ft. Prentiss. New.
1 each. Plain Engine Lathe 16 in. x 4 ft., & 6 ft. "
1 15 in. x 4 ft. Turret Lathe. Lodge & Barker.
1 13 in. x 4 ft. Turret Lathe.
1 Fox Turret Lathe, 16 in. x 6 ft. Lodge & Barker. New.
1 Planer, each 24 in. x 24 in. x 5 x 6 ft. Second-hand.
1 " 22 in. x 20 in. x 5 ft. new
1 " 16 in. x 16 in. x 4 ft. "
1 " 26 in. x 26 in. x 7 ft. "
1 " 30 in. x 30 in. x 8 ft. 2nd Hand.
1 " 36 in. x 36 in. x 10 ft. Good Order.
1 16 in. Lever Table Drill. New.
1 each 16, 20, 22 & 24 in. Upright Drills. Prentiss.
1 19 in. Upright Drill. Blaisdell.
1 each 25, 28 & 34 in. B. G. & S. F. Dril's. Blaisdell.
1 each 9, 12 and 18 in. Shapers. Prentiss.
1 each 10 and 15 in. Shapers. Gould & Eberhardt.
1 each 15 & 24 in. Shapers. Hendey. New.
Full assortment Milling Machines, Spindle Drills, &c., of Garvin's.
1 each Nos. 2 & 4 Screw Machines, Wire Feed, Jones & Lamson.
3 No. 2 Lincoln Millers. Good order
2 No. 2 Lincoln Millers. New.
1 Hand Lathe, 12 x 4, 5 and 6 ft. New.
1 Hand Lathe, 16 in. x 6 and 7 ft. New.
1 Boring and Turning Mill, 72 in. 2 Heads. New.
1 Boring and Turning Mill, 50 in. New.
1 Horizontal Boiler, 4 ft. x 14½ ft. Good Order.
1 Cutting-off Machine to take sizes to 5 in.
1 Gray's Screw Machine, to take all sizes to 1 in.
1 2-Spindle Edging Machine. Good order.
1 each 3 and 7 Spindle Nut Tapper.
1 26 in. Gear Cutter. New.
All kinds Machinists' Small Tools and Supplies.

NEW YORK AGENCY OF THE TANITE CO., AND FOR THE "NEW POLISHED" SHAFTING.

H. PRENTISS & COMPANY 42 DEY ST., N. Y.

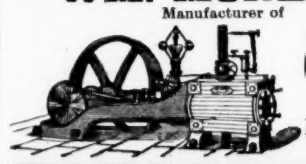
A. M. POWELL & CO.,

Worcester, Mass.,
MANUFACTURERS OF
Iron Working Machinery,

ENGINE LATHES
16 inch to 30 inch Swing.
PLANERS
To Plane 22 to 32 inches Square.
Chucking Lathes, Pulley Lathes, &c.
Write for Prices and Descriptive Circular.

WM. MÜNZER,

Manufacturer of



IMPROVED CORLISS ENGINE.
1st Av. cor. 30th St.
New York.

HOW TO KEEP **BOILERS** CLEAN

FREE Book Sent To Any Address
By JAS. F. HOTCHKISS, 84 JOHN ST. N.Y.

S. ASHTON HAND,

Toughkenamon, Chester Co., Pa.,
MAKER OF FIRST-CLASS
ENGINE LATHES

Is now in position to put on the market
14" ENGINE LATHES OF NEW DESIGN
guaranteed to be equal in material, design and workmanship to the best ever offered.

SHAPING MACHINES.

6 in. and 8 in. Hand and Power.
SEND FOR CIRCULAR.
BOYNTON & PLUMMER, Worcester, Mass.

LIST OF NEW MACHINERY FOR SALE.

One Engine Lathe, 20 feet bed, 42 in. swing.
One " 18 " 36 "
One " each 14, 16 and 18 feet bed, 30 in. swing.
One Engine Lathe, each 10 and 12 feet bed, 27 in. swing.
One Engine Lathe, each 8, 10 and 12 feet bed, 23 in. swing.
One Engine Lathe, each 8, 10 and 12 feet bed, 19 in. swing.
One Engine Lathe, 8 feet bed, 18 in. swing.
One " each 6 and 8 feet bed, 16 in. swing.
One Engine Lathe, 6 feet bed, 15 in. swing.
One " 5 " 11 "
Two Iron Planers, to plane 10 feet, 30 x 30 in.
Two " to plane 7 feet, 26 x 26 in.
Two " to plane 4 feet, 22 x 22 in.
One each 22, 24, 26, 30 and 38 in. swing B. G. S. F. Upright Iron Drills.
One Shaper, each 10 and 15 in. stroke.
Two Shapers, each 12 in. stroke.
Two Bolt Cutters, to cut 1⅛ and 2 in.

Send for lists of New and Second-hand Tools.

The George Place Machinery Co.,
121 CHAMBERS AND 103 READE STREETS, NEW YORK.

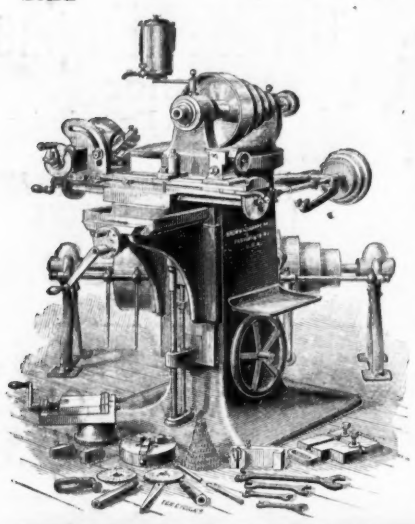
SMALL SIZE

Universal Milling Machine.

MADE BY

BROWN & SHARPE M'F'G CO.

PROVIDENCE, R. I., U. S. A.

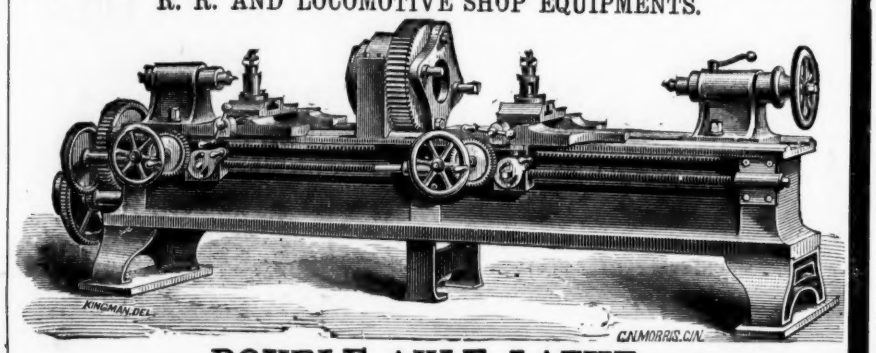


This machine has all the movements of a plain Milling Machine, and, in addition, is fed automatically, at an angle to the axis of Spindle, and has an adjustment to stop at any required point. The knee can be moved perpendicularly through a distance of 14 inches, and has a dial giving a reading in thousandths of inches. The Saddle, holding the Spiral Bed also, has a movement, parallel with axis of Main Spindle, of 6 inches, also indicated in thousandths of inches. On the Spiral Bed are placed a Head and Foot Stock, having centers upon which Reamers, Taps, Drills, or Mills can be held for grooving, etc., either straight or spiral, right or left hand. The Head, holding one center can be set at any angle between 5 degrees below a horizontal to a perpendicular position, and upon an Arbor inserted in the Spindle can be cut angular Mills, Cutters, or Bevel-gears. The Head can also be placed at a right angle on the Bed, and operations performed upon the face of work held in a chuck which goes upon the end of Spindle. The Vise shown in cut has Jaws 5 inches wide, 1 inch deep, will open 2¾ inches, and can be clamped upon the Bed at any angle.

☞ Illustrated catalogue sent per mail on application.

CAR WHEEL AND AXLE MACHINERY,

R. R. AND LOCOMOTIVE SHOP EQUIPMENTS.



DOUBLE AXLE LATHE.

NILES TOOL WORKS, HAMILTON, OHIO.

EASTERN WAREROOMS, 22 S. SIXTH ST., PHILADELPHIA, PA.

WESTON'S PATENT POWER Traveling Cranes

OF ANY CAPACITY.

Particulars on application, and full specification and tender promptly submitted on receipt of capacity and span of bridge desired.

SOLE MAKERS,

THE YALE & TOWNE MANUFACTURING CO.

STAMFORD, CONN.

JUST OUT.—A preliminary illustrated and descriptive circular of the various types of cranes made by us, mailed on application.

LODGE, BARKER & CO., CINCINNATI, OHIO.

Engine Lathes and Turret Lathes.

NOTICE OF REMOVAL.

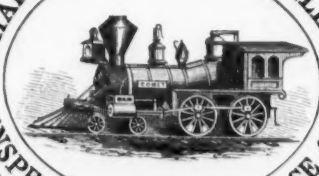
We have removed to our new iron building, northwest corner 6th and Eggleston Avenue. Ground floor covers a space of 11,000 square feet, and are now prepared to fill all orders promptly and at reasonable prices.

Immediate delivery for 18-inch ENGINE LATHES any length, also FOX MONITOR LATHES.

Gould & Eberhardt, AUTOMATIC Gear Cutters,

NEWARK, N. J.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.



J. M. ALLEN, PRESIDENT.
W. B. FRANKLIN, VICE-PRESIDENT
J. B. PIERCE, SECRETARY.

THE PRATT & WHITNEY CO., HARTFORD, CONN.

Have Ready for Delivery:

Drilling Machines—No. 2 Upright, No. 3 Vertical; Nos. 1 and 3, Manufacturers' and Manufacturer's Bench; Champion Drills; No. 0 and 1 Gang Drills, and Double Head Traverse; 1, 14 in. Shaping Machine; Hand Lathes, 12 and 18 in. swing; Cutting-off Lathes for 2½ and 4½ in. diameter. Revolving Head Screw Machines, Nos. 2 and 3; Hand Milling Machines, No. 3; Power Milling Machine, Nos. 2 and 3; Bolt Cutters, Turret Head, Nos. 2, 3 and 4; National, Nos. 2 and 4. Nos. 1 and 2 Screw Shaving Machines; No. 1 Screw Slotting Machine. 13 in. Grinding and 16 in. Spinning Lathes. 13 in. Plain Engine Lathes. 16 in. Weighted Screw Cutting Lathe. One Double Connection Power Press. Index Milling Machines. No. 2 Horizontal Tapping Machines. Cutter Grinders. 16 and 20 in. Planers. 10 in. Pillar Shapers and Drill Grinding Machines. **Have increased discount on Combination Lathe Chucks; quotations on application.**

Can furnish at 3 to 8 weeks' notice, 24, 30, 34 and 40 in. Planers.

DROP FORGINGS BILLINGS & SPENCER CO. HARTFORD, CONN. U.S.A.

ALSO

BILLINGS' PATENT ADJUSTABLE POCKET WRENCHES, 4 AND 6 INCHES.

FINISHED SCREW PLATES AND DIES, GENUINE PACKER RATCHET DRILLS, BILLINGS' PATENT DOUBLE ACTION RATCHET DRILLS, TAP & REAMER WRENCHES.

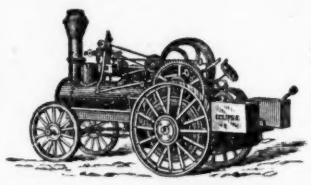
CLAMP, DIE & COMMON LATHE DOGS, COMBINATION PLIERS, BEACH'S PATENT THREAD-CUTTING TOOLS BARWICK PIPE WRENCHES.

Billings' Patent Drop Forged and Cold-Pressed Sewing Machine Shuttles.

AND ALL DESCRIPTIONS OF

STEEL AND IRON DROP FORGINGS.

ECLIPSE PORTABLE & TRACTION ENGINES



Stationary Engines.
Iron and Steel Boilers.
Portable Circular Saw Mills.
Threshers & Separators

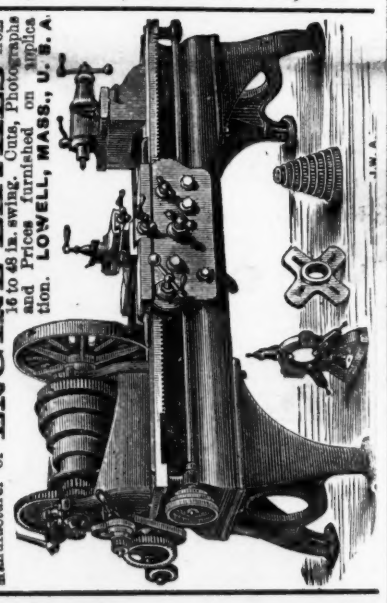
Send for Catalogue and say where you saw this.

FRICK & CO.

Waynesboro, Franklin Co., Pa.

GEO. W. FIFIELD,

Manufacturer of ENGINE LATHES from 16 to 48 in. swing. Cuts, Photographs and Prices furnished on application. LOWELL, MASS., U. S. A.

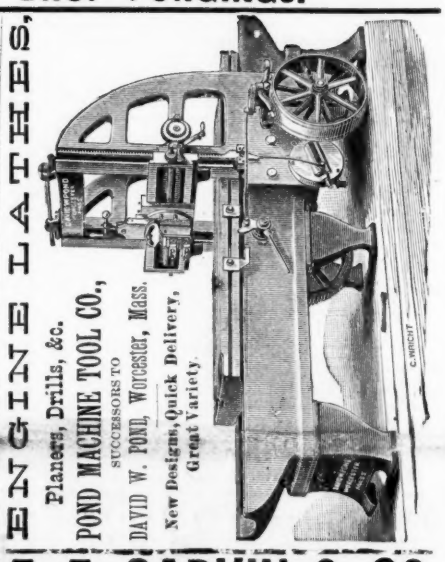


ENGINE LATHES,

Planers, Drills, &c.

POND MACHINE TOOL CO., SUCCESSORS TO DAVID W. POND, WORCESTER, MASS.

New Designs, Quick Delivery, Great Variety.

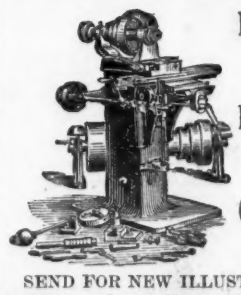


E. E. GARVIN & CO.

139 & 141 Centre St., New York,

MANUFACTURERS OF

MACHINISTS' TOOLS,



Milling Machines,
Drill Presses,
Hand Lathes,
Tapping Machines,
Cutter Grinders, &c.

SEND FOR NEW ILLUSTRATED CATALOGUE containing descriptions of the above machines.

ROP HAMMERS

Punching Presses
DIES AND OTHER TOOLS
For the manufacture of all kinds of SHEET METAL GOODS, DROP FORGINGS, &c.
Stiles & Parker Press Co., Middletown, Conn.

THE BUFFALO STEEL FOUNDRY, BUFFALO, N. Y.

ORDERS AND CORRESPONDENCE SOLICITED.

PRATT & LETCHWORTH, Proprietors.

G. A. GRAY, Jr. & Co.,

MACHINE TOOLS. Iron and Brass Working Machinery.

42 E. 8th St., Cincinnati, O.

The Babcock & Wilcox Co.'s

WATER TUBE STEAM BOILERS.

Branch Offices: Boston, 50 Oliver St. Syracuse, Room 15, White Buildings. Philadelphia, 32 N. 5th St. Pittsburgh, 91 4th Ave.

NEW YORK: 30 CORTLANDT ST.

GLASGOW: 107 HOPE ST.

Branch Offices: Baltimore, Room 45, Chamber Commerce Building. Chicago, 48 So. Canal St. New Orleans, 60 Carondelet. San Fra'co, 505 Mission St.

J.M. CARPENTER PAWTUCKET, R.I.

MANUFACTURER OF

TAPS & DIES.